North Caldwell Mathematics

Grade Level: 5

Contents

Instructional Materials

Everyday Mathematics 4th Edition
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Supplemental Resources

- Connected Ed https://connected.mcgraw-hill.com/connected/login.do
- Illustrative Mathematics https://www.illustrativemathematics.org/
- Khan Academy https://www.khanacademy.org/
- Math for Elementary School Teachers http://www.mathforelementaryteachers.org/ video clips that contain explanations of arithmetic topics including: Place Value/Arithmetic Models/Arithmetic Algorithms, Mental Math, Primes/Divisibility, Fraction Arithmetic, and Word Problems/Model Drawing.
- National Council of Teachers of Mathematics http://www.nctm.org/
- National Library of Virtual Manipulatives http://nlvm.usu.edu/
- NCTM Illuminations Resources for Teaching Math http://illuminations.nctm.org/

Interdisciplinary Connections

Mathematics is a unified body of knowledge whose concepts build upon each other. Connecting mathematical concepts includes linking ideas to related ideas learned previously.

Major emphasis should be given to ideas and concepts across mathematical content areas that help students see that mathematics is a web of closely connected ideas. Students need to connect their mathematical learning to appropriate real-world contexts. They need to create interest and maintain the interest after the novelty of the work has worn off.

Mathematics is the language of science and is greatly utilized in industry and business. It gives us the power to solve difficult real-world problems, but also helps us to understand how the universe operates.

Every mathematics teacher needs to make students unafraid of the subject by convincing the students of the usefulness of learning mathematics in their daily lives and for higher studies. The world today, which leans more and more heavily on Science and Technology, demands more from mathematics. Tomorrow's world will, no doubt, make still greater demands from mathematics.

Interdisciplinary Connections for Grade 5

See Me in Space-A Walk through the Solar System

SUBJECT AREA: Science, Language Arts, Social Studies, Math, Art

A practice in scientific notation, measurement, and scale distances, this lesson plan integrates mathematics into the science curriculum. Students will apply knowledge of the properties, movements, and locations of objects in our solar system. We hope that our students will be able to recognize and elaborate on each of the planets and be able to transfer knowledge from one curricular area to the next.

http://www.learnnc.org/lp/pages/3091

Myahsteward.weebly.com

Be the Author of Your Own Problem!

SUBJECT AREA: ELA- Writing, Reading, Math, Art

Students will become authors of their own division word problems. Before writing students will brainstorm ideas and wording for their word problems. Word problems can be centered around a grade level related theme. (read-aloud book, science unit, ss unit, season etc). Students will need to write a division word problem that includes a remainder in the quotient. The final result should include: word problem, number sentence, illustration, solution, and an explanations of what they did with the remainder and why.

5th Grade Shape Sorter

SUBJECT AREA: Math, Science, ELA-Writing and Presenting, Art, Technology

Students will work in small groups to design a machine that sorts triangles and quadrilaterals. They are required to draw, describe and present their machines. Their drawing is a detailed diagram that explains how their machine sorts the shapes. The written response is a description of what happens with two different shapes as they travel through the machine. Presentations are an overview of their machine, where both teacher and classmates can ask questions.

Google Doc- directions

Interdisciplinary Connections (continued)

Design Your Own Classroom

SUBJECT AREA: Math, art, technology, ELA-Writing

Students will study interior design as a profession as well as a vocation. They will integrate their study with math, writing, and computer skills by designing a classroom of their dreams. They will learn to draw given lengths accurately. They will practice measuring to scale and convert actual to scale sizes, while integrating the geometry unit in mathematics. The students will work in small groups to integrate writing and computer technology by developing a precise description of their dream room and presenting through slides and sheets.

Google Doc-docs and rubric

Fairytale Word Problems

SUBJECT AREA: ELA- Writing, Reading, Math, Art, Technology

This lesson is a hands-on math lesson that is meant to stimulate critical thinking as well as reinforce vocabulary that is necessary to be able to create and solve word problems both on paper and on the computer. Students will be able to generate and utilize a list of math vocabulary words by identifying which operations they reflect and by using them when they create their own word problems incorporating fairytales as their LA focus. Students will be able to work cooperatively with a partner to participate in creating their own word problem and showing the work for a class book. They will first sketch out this page and then be asked to input it using Google Slides. The students will then need to present their word problems to the class via slideshow on Google Slides.

Google Docs- directions & rubric

Willis Tower

SUBJECT AREA: Math, Soc.St., LA, Art

Students apply their knowledge of volume concepts to calculate the volume of a building. The students will read and research the Willis Tower in Chicago, IL. They will work in small groups to find the volume of Willis Tower. They will need to estimate the volume of Willis Tower and make posters summarizing their work.

Everyday Math lesson 6-13

New Jersey Student Learning Standards (NJSLS)

In Grade 5, instructional time should focus on three critical areas: (1) developing fluency with addition and subtraction of fractions, and developing understanding of the multiplication of fractions and of division of fractions in limited cases (unit fractions divided by whole numbers and whole numbers divided by unit fractions); (2) extending division to 2-digit divisors, integrating decimal fractions into the place value system and developing understanding of operations with decimals to hundredths, and developing fluency with whole number and decimal operations; and (3) developing understanding of volume.

(1) Students apply their understanding of fractions and fraction models to represent the addition and subtraction of fractions with unlike denominators as equivalent calculations with like denominators. They develop fluency in calculating sums and differences of fractions, and make reasonable estimates of them. Students also use the meaning of fractions, of multiplication and division, and the relationship between multiplication and division to understand and explain why the procedures for multiplying and dividing fractions make sense. (Note: this is limited to the case of dividing unit fractions by whole numbers and whole numbers by unit fractions.)

(2) Students develop understanding of why division procedures work based on the meaning of base-ten numerals and properties of operations. They finalize fluency with multi-digit addition, subtraction, multiplication, and division. They apply their understandings of models for decimals, decimal notation, and properties of operations to add and subtract decimals to hundredths. They develop fluency in these computations, and make reasonable estimates of their results. Students use the relationship between decimals and fractions, as well as the relationship between finite decimals and whole numbers (i.e., a finite decimal multiplied by an appropriate power of 10 is a whole number), to understand and explain why the procedures for multiplying and dividing finite decimals make sense. They compute products and quotients of decimals to hundredths efficiently and accurately.

(3) Students recognize volume as an attribute of three-dimensional space. They understand that volume can be measured by finding the total number of same-size units of volume required to fill the space without gaps or overlaps. They understand that a 1-unit by 1-unit by 1-unit cube is the standard unit for measuring volume. They select appropriate units, strategies, and tools for solving problems that involve estimating and measuring volume. They decompose three-dimensional shapes and find volumes of right rectangular prisms by viewing them as decomposed into layers of arrays of cubes. They measure necessary attributes of shapes in order to determine volumes to solve real world and mathematical problems.

Operations and Algebraic Thinking

Write and interpret numerical expressions.

5.OA.1 Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols.

5.OA.2 Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them. *For example, express the calculation "add 8 and 7, then multiply by 2" as 2 × (8 + 7). Recognize that 3 × (18932 + 921) is three times as large as 18932 + 921, without having to calculate the indicated sum or product.*

Understandings	Essential Questions
Students will understand… • the order of operations affects the value of the answer.	• Why is there an order to follow to compute answers?
Knowledge	**Skills**

Students will know . . .
• the order of operations is as follows:
  • parentheses
  • exponents
  • multiplication and division, left to right
  • addition and subtraction, left to right.
	Students will be able to . . .
	• use the order of operations to find answers to expressions.
	• write simple expressions that record calculations with numbers.
	• interpret numerical expressions without evaluating them.

RESOURCES

- **Everyday Mathematics 4 Lessons:** 1-1, 1-5, 1-7, 1-8, 1-9, 1-11, 1-12, 2-3, 2-5, 2-6, 2-7, 2-8, 2-10, 3-1, 3-3, 3-6, 3-8, 3-11, 4-3, 4-10, 4-11, 6-2, 6-8, 6-13, 7-1 (1-2, 1-3, 1-4, 1-6, 1-8, 1-10, 2-1, 2-2, 2-4, 2-14, 3-2, 3-3, 3-4, 3-9, 3-10, 3-11, 3-12, 3-13, 3-14)
- **Supplemental Lessons:** Binder pages 5-38

Operations and Algebraic Thinking

Analyze patterns and relationships.

5.OA.3 Generate two numerical patterns using two given rules. Identify apparent relationships between corresponding terms. Form ordered pairs consisting of corresponding terms from the two patterns, and graph the ordered pairs on a coordinate plane. *For example, given the rule "Add 3" and the starting number 0, and given the rule "Add 6" and the starting number 0, generate terms in the resulting sequences, and observe that the terms in one sequence are twice the corresponding terms in the other sequence. Explain informally why this is so.*

Understandings	Essential Questions
Students will understand… • patterns can be put together to generate new patterns.	• How are the coordinate points related to patterns?
Knowledge	**Skills**
Students will know . . . • that to determine if there is a pattern present in a set of numbers, one can look for constant change between the variables.	Students will be able to . . . • generate patterns from other patterns. • graph ordered pairs generated by the pattern on a coordinate plane.

RESOURCES

- **Everyday Mathematics 4 Lessons:** 4-9, 5-6, 7-10, 7-11, 7-12, 7-13, 8-2, 8-9 (6-10, 6-14, 7-14, 8-6, 8-10,8-12)
- **Supplemental Lessons:** Binder pages 56-87

Numbers and Operations in Base Ten

Understand the place value system.

5.NBT.1 Recognize that in a multi-digit number, a digit in one place represents 10 times as much as it represents in the place to its right and 1/10 of what it represents in the place to its left.

5.NBT.2 Explain patterns in the number of zeros of the product when multiplying a number by powers of 10, and explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10. Use whole-number exponents to denote powers of 10.

5.NBT.3 Read, write, and compare decimals to thousandths.

a. Read and write decimals to thousandths using base-ten numerals, number names, and expanded form,
   e.g., $347.392 = 3 \times 100 + 4 \times 10 + 7 \times 1 + 3 \times (1/10) + 9 \times (1/100) + 2 \times (1/1000)$.
b. Compare two decimals to thousandths based on meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons.

5.NBT.4 Use place value understanding to round decimals to any place.

Understandings	Essential Questions
Students will understand… • each place in the place-value system has a limit to the value which can be placed there. • the same relationship exists between any two adjacent places in the place-value system. • placement of a number into a place in the place-value system has a significant effect on its value.	• How does the location of a number in a place-value system affect the value of the number? • How is place value used to round numbers? • What is the significance of the decimal point?
Knowledge	**Skills**
Students will know . . . • when the value in a place exceeds the limit, it must change places. • in a multi-digit number, a digit in one place represents 10 times as much as it represents in the place to its right and 1/10 of what it represents in the place to its left. • place-value understanding is needed to round decimals to any place. • the place to examine in order to round numbers, including decimals.	Students will be able to . . . • read and write decimals to thousandths using base-ten numerals, number names, and expanded form. • compare two decimals to thousandths. • use >, =, and < symbols to record the results of comparisons.

RESOURCES

- **Everyday Mathematics 4 Lessons:** 1-1, 2-1, 2-2, 2-3, 2-4, 2-5, 2-7, 2-8, 2-9, 2-10, 2-12, 2-13, 3-2, 3-5, 3-9, 3-10, 3-13, 3-14, 4-1, 4-2, 4-3, 4-4, 4-5, 4-7, 4-8, 4-9, 4-11, 4-12, 4-13, 4-14, 5-1, 5-3, 5-4, 5-5, 5-6, 5-8, 5-9, 5-10, 6-1, 6-2, 6-3, 6-4, 6-6, 6-7, 6-9, 6-10, 6-11, 6-12, 6-13, 7-2, 7-3, 7-5, 7-12, 8-1, 8-4, 8-5, 8-7, 8-8, 8-10, 8-11, 8-12 (1-2, 1-4, 1-8, 1—13, 2-3, 2-6, 2-7, 2-8, 2-8, 2-11, 2-12, 3-1, 3-3, 3-4, 3-5, 3-6, 3-7, 3-8, 3-10, 3-15, 4-5, 4-6, 4-7, 4-9, 4-11, 4-12, 4-13, 4-14, 5-1, 5-2, 5-3, 5-5, 5-6, 5-7, 5-8, 5-10, 5-11, 5-13, 5-15, 6-2, 6-3, 6-4, 6-5, 6-6, 6-8, 6-11, 6-13, 7-1, 7-8, 7-10, 7-14, 8-2, 8-9)
- **Supplemental Lessons:** Binder pages 5-11, 21-87

Numbers and Operations in Base 10

Perform operations with multi-digit whole numbers and with decimals to hundredths.

5.NBT.5 Fluently multiply multi-digit whole numbers using the standard algorithm.

5.NBT.6 Find whole-number quotients of whole numbers with up to four-digit dividends and two-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.

5.NBT.7 Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.

Understandings	Essential Questions
Students will understand… • rectangles have an area that represents the product of the two dimensions. •	• How are products and quotients related?
Knowledge	**Skills**
Students will know . . . • multi-digit computation is just an extension of single-digit computations.	Students will be able to . . . • fluently multiply multi-digit whole numbers using the standard algorithm. • find whole-number quotients of whole numbers with up to four-digit dividends and two-digit divisors. • illustrate and explain calculations by using equations, rectangular arrays, and/or area models. • add, subtract, multiply, and divide decimals to hundredths.

RESOURCES

- **Everyday Mathematics 4 Lessons:** 1-2, 1-7, 1-11, 2-4, 2-5, 2-6, 2-7, 2-8, 2-9, 2-10, 2-11, 2-12, 2-13, 3-1, 3-2, 3-3, 3-4, 3-5, 3-6, 3-9, 3-12, 3-14, 4-4, 4-7, 4-11, 4-12, 4-13, 4-14, 5-1, 5-3, 5-7, 5-8, 5-9, 5-12, 6-4, 6-5, 6-6, 6-8, 6-9, 6-10, 6-11, 6-12, 6-13, 7-4, 7-6, 7-7, 7-12, 7-13, 8-1, 8-2, 8-3, 8-5, 8-6, 8-7, 8-8, 8-9, 8-10 (1-8, 1-13, 2-10, 2-11, 2-12, 2-13, 3-3, 3-4, 3-5, 3-7, 3-8, 3-9, 3-11, 3-12, 3-13, 3-14, 4-1, 4-2, 4-3, 4-5, 4-6, 4-7, 4-8, 4-11, 4-12, 4-14, 5-1, 5-2, 5-3, 5-4, 5-5, 5-6, 5-7, 5-8, 5-10, 5-11, 5-13, 5-14, 5-15, 6-2, 6-3, 6-4, 6-8, 7-1, 7-2, 7-3, 7-5, 7-8, 7-9, 7-10, 7-11, 8-1, 8-11, 8-12, 8-13)
- **Supplemental Lessons:** Binder pages 29-30, 39-87

Number and Operations - Fractions

Use equivalent fractions as a strategy to add and subtract fractions.

5.NF.1 Add and subtract fractions with unlike denominators (including mixed numbers) by replacing given fractions with equivalent fractions in such a way as to produce an equivalent sum or difference of fractions with like denominators. *For example, 2/3 + 5/4 = 8/12 + 15/12 = 23/12. (In general, a/b + c/d = (ad + bc)/bd.)*

5.NF.2 Solve word problems involving addition and subtraction of fractions referring to the same whole, including cases of unlike denominators, e.g., by using visual fraction models or equations to represent the problem. Use benchmark fractions and number sense of fractions to estimate mentally and assess the reasonableness of answers. *For example, recognize an incorrect result 2/5 + 1/2 = 3/7, by observing that 3/7 < 1/2.*

Understandings	Essential Questions
Students will understand… • fractions must have common denominators in order to be added or subtracted.	• When would one use addition or subtraction of fractions?
Knowledge	**Skills**
Students will know . . . • that a common denominator is a common multiple of the two denominators (usually the least common one). • that when adding fractions, the common denominators do not get added together, only the numerators do.	Students will be able to . . . • add and subtract fractions with unlike denominators (including mixed numbers). • solve word problems involving addition and subtraction of fractions referring to the same whole, including cases of unlike denominators. • use benchmark fractions and number sense of fractions to estimate mentally and assess the reasonableness of answers.

RESOURCES

- **Everyday Mathematics 4 Lessons:** 1-2, 1-4, 3-4, 3-6, 3-7, 3-9, 3-10, 3-11, 3-12, 4-2, 4-3, 4-8, 5-1, 5-2, 5-3, 5-4, 5-11, 6-4, 6-5, 6-7, 7-1, 7-5, 7-6, 7-9, 8-2, 8-8 (2-10, 2-14, 3-13, 3-14, 4-1, 4-3, 4-4, 4-5, 4-6, 4-7, 4-10, 4-11, 4-13, 4-15, 5-5, 5-6, 5-7, 5-8, 5-9, 5-10, 5-12, 5-13, 5-14, 6-1, 6-2, 6-3, 6-6, 6-8, 6-11, 6-13, 7-2, 7-3, 7-4, 7-6, 7-8, 7-11, 7-13)
- **Supplemental Lessons:** Binder pages 31-87

Numbers and Operations – Fractions

Apply and extend previous understandings of multiplication and division to multiply and divide fractions.

5.NF.3 Interpret a fraction as division of the numerator by the denominator ($a/b = a \div b$). Solve word problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers, e.g., by using visual fraction models or equations to represent the problem. *For example, interpret 3/4 as the result of dividing 3 by 4, noting that 3/4 multiplied by 4 equals 3, and that when 3 wholes are shared equally among 4 people each person has a share of size 3/4. If 9 people want to share a 50-pound sack of rice equally by weight, how many pounds of rice should each person get? Between what two whole numbers does your answer lie?*

5.NF.4 Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction.

a. Interpret the product $(a/b) \times q$ as a parts of a partition of q into b equal parts; equivalently, as the result of a sequence of operations $a \times q \div b$. *For example, use a visual fraction model to show $(2/3) \times 4 = 8/3$, and create a story context for this equation. Do the same with $(2/3) \times (4/5) = 8/15$. (In general, $(a/b) \times (c/d) = ac/bd$.)*
b. Find the area of a rectangle with fractional side lengths by tiling it with unit squares of the appropriate unit fraction side lengths, and show that the area is the same as would be found by multiplying the side lengths. Multiply fractional side lengths to find areas of rectangles, and represent fraction products as rectangular areas.

5.NF.5 Interpret multiplication as scaling (resizing), by:

a. Comparing the size of a product to the size of one factor on the basis of the size of the other factor, without performing the indicated multiplication.
b. Explaining why multiplying a given number by a fraction greater than 1 results in a product greater than the given number (recognizing multiplication by whole numbers greater than 1 as a familiar case); explaining why multiplying a given number by a fraction less than 1 results in a product smaller than the given number; and relating the principle of fraction equivalence $a/b = (n \times a)/(n \times b)$ to the effect of multiplying a/b by 1.

5.NF.6 Solve real world problems involving multiplication of fractions and mixed numbers, e.g., by using visual fraction models or equations to represent the problem.

5.NF.7 Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions.[1]

a. Interpret division of a unit fraction by a non-zero whole number, and compute such quotients. *For example, create a story context for $(1/3) \div 4$, and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that $(1/3) \div 4 = 1/12$ because $(1/12) \times 4 = 1/3$.*
b. Interpret division of a whole number by a unit fraction, and compute such quotients. *For example, create a story context for $4 \div (1/5)$, and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that $4 \div (1/5) = 20$ because $20 \times (1/5) = 4$.*
c. Solve real world problems involving division of unit fractions by non-zero whole numbers and division of whole numbers by unit fractions, e.g., by using visual fraction models and equations to represent the problem. *For example, how much chocolate will each person get if 3 people share 1/2 lb of chocolate equally? How many 1/3-cup servings are in 2 cups of raisins?*

[1] Students able to multiply fractions in general can develop strategies to divide fractions in general, by reasoning about the relationship between multiplication and division. But division of a fraction by a fraction is not a requirement at this grade.

(Continued on next page)

Understandings	Essential Questions
Students will understand… • a fraction is division of the numerator by the denominator ($a/b = a \div b$). • when multiplying by a fraction less than one, the product will be smaller than the first factor. • when multiplying by a fraction greater than one, the product will be larger than the first factor.	• What does it mean to divide by a fraction? • Why would one need to divide by a fraction?
Knowledge	**Skills**
Students will know . . . • the relative size of the answer based on the sizes of the factors.	Students will be able to . . . • solve word problems involving division of whole numbers. • multiply a fraction or whole number by a fraction. • find the area of a rectangle with fractional side lengths by tiling it with unit squares of the appropriate unit fraction side lengths. • show that the area from tiles is the same as would be found by multiplying the side lengths. • multiply fractional side lengths to find areas of rectangles, and represent fraction products as rectangular areas. • solve real world problems involving multiplication of fractions and mixed numbers. • divide unit fractions by whole numbers and whole numbers by unit fractions. • interpret division of a unit fraction by a non-zero whole number. • interpret division of a whole number by a unit fraction. • solve real world problems involving division of unit fractions by non-zero whole numbers and division of whole numbers by unit fractions.
RESOURCES	
• **Everyday Mathematics 4 Lessons:** 1-1, 1-2, 1-3, 1-4, 1-6, 3-1, 3-2, 3-3, 3-4, 3-5, 3-6, 3-8, 3-10, 3-11, 3-12, 3-13, 3-14, 4-1, 4-2, 4-3, 4-4, 4-5, 4-6, 4-8, 4-9, 4-12, 4-14, 5-1, 5-2, 5-3, 5-4, 5-5, 5-6, 5-7, 5-8, 5-9, 5-10, 5-11, 5-12, 5-13, 5-14, 6-2, 6-4, 6-5, 6-6, 6-7, 6-8, 6-10, 6-12, 6-13, 7-1, 7-2, 7-3, 7-4, 7-5, 7-6, 7-7, 7-8, 7-9, 7-10, 7-11, 7-12, 8-1, 8-2, 8-3, 8-6, 8-7, 8-8, 8-9, 8-10 (1-5, 1-7, 1-9, 1-10, 1-11, 1-12, 2-1, 2-3, 2-10, 2-14, 3-2, 3-4, 3-13, 3-14, 4-1, 4-3, 4-4, 4-5, 4-6, 4-7, 4-9, 4-10, 4-15, 5-1, 5-5, 5-6, 5-7, 5-8, 5-9, 5-10, 5-11, 5-12, 5-13, 5-14, 5-15, 6-1, 6-3, , 6-4, 6-5, 6-6, 6-7, 6-8, 6-9, 6-10, 6-11, 6-12, 6-13, 6-14, 7-1, 7-2, 7-3, 7-4, 7-5, 7-6, 7-7, 7-8, 7-9, 7-10, 7-11, 7-12, 7-13, 7-14, 8-1, 8-2, 8-3, 8-4, 8-5, 8-6, 8-7, 8-8, 8-9, 8-11, 8-12, 8-13) • **Supplemental Lessons:** Binder pages 5-11, 21-87	

Measurement & Data

Convert like measurement units within a given measurement system.

5.MD.1 Convert among different-sized standard measurement units within a given measurement system (e.g., convert 5 cm to 0.05 m), and use these conversions in solving multi-step, real world problems.

Understandings	Essential Questions
Students will understand… • measurement units vary in the customary system differently than in the metric system. • understanding place value helps one to understand the metric system.	• Why would one need to convert measurements from one unit to another? • How does one know whether the new answer should be a bigger or smaller number of units?
Knowledge	**Skills**
Students will know . . . • every step in the metric system involves a power of 10, e.g. 10 cm = 1 decimeter, 10 mm = 1 cm, etc.) • customary equivalents.	Students will be able to . . . • convert among different-sized standard measurement units within a given measurement system. • solve real-world problems involving conversions.

RESOURCES

- **Everyday Mathematics 4 Lessons:** 1-1, 1-3, 1-6, 1-8, 1-10, 1-11, 2-6, 2-10, 4-4, 5-13, 6-3, 6-4, 7-3, 7-11, 8-1, 8-5, 8-6, 8-7, 8-8, 8-9, 8-10 (1-2, 1-4, 1-12, 2-1, 2-3, 2-9, 2-12, 3-1, 3-3, 3-6, 3-8, 4-2, 5-2, 5-4, 7-10, 7-14, 8-13)
- **Supplemental Lessons:** Binder pages 5-11, 21-45

Measurement & Data

Represent and interpret data.

5.MD.2 Make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8). Use operations on fractions for this grade to solve problems involving information presented in line plots. *For example, given different measurements of liquid in identical beakers, find the amount of liquid each beaker would contain if the total amount in all the beakers were redistributed equally.*

Understandings	Essential Questions
Students will understand… • data entries do not have to be only whole numbers. • the scale on a line plot must be evenly spaced.	• What types of data can be graphed on a line plot with a fractional scale?
Knowledge	**Skills**
Students will know . . . • there will still be a whole number of pieces of data even though there is a fractional scale.	Students will be able to . . . • make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8). • use operations on fractions for this grade to solve problems involving information presented in line plots.

RESOURCES

- **Everyday Mathematics 4 Lessons:** 6-4, 6-5, 6-13, 7-1, 7-9, 8-8 (6-11, 7-6, 7-8, 8-2, 8-4)

Measurement & Data

Geometric measurement: understand concepts of volume and relate volume to multiplication and to addition.

5.MD.3 Recognize volume as an attribute of solid figures and understand concepts of volume measurement.

a. A cube with side length 1 unit, called a "unit cube," is said to have "one cubic unit" of volume, and can be used to measure volume.
b. A solid figure which can be packed without gaps or overlaps using *n* unit cubes is said to have a volume of *n* cubic units.

5.MD.4 Measure volumes by counting unit cubes, using cubic cm, cubic in, cubic ft, and non-standard units.

5.MD.5 Relate volume to the operations of multiplication and addition and solve real world and mathematical problems involving volume.

a. Find the volume of a right rectangular prism with whole-number side lengths by packing it with unit cubes, and show that the volume is the same as would be found by multiplying the edge lengths, equivalently by multiplying the height by the area of the base. Represent threefold whole-number products as volumes, e.g., to represent the associative property of multiplication.
b. Apply the formulas $V = l \times w \times h$ and $V = B \times h$ for rectangular prisms to find volumes of right rectangular prisms with whole-number edge lengths in the context of solving real world and mathematical problems.
c. Recognize volume as additive. Find volumes of solid figures composed of two non-overlapping right rectangular prisms by adding the volumes of the non-overlapping parts, applying this technique to solve real world problems.

Understandings	Essential Question
Students will understand… • volume is an attribute of solid figures. • the concept of volume measurement involves filling up space. • volume is related to the operations of multiplication and addition. • volume is additive.	• For what types of items can we measure volume?
Knowledge	**Skills**
Students will know . . . • a cube with side length 1 unit, called a "unit cube," is said to have "one cubic unit" of volume, and can be used to measure volume. • a solid figure which can be packed without gaps or overlaps using *n* unit cubes is said to have a volume of *n* cubic units.	Students will be able to . . . • measure volumes by counting unit cubes, using cubic cm, cubic in, cubic ft, and improvised units. • solve real world and mathematical problems involving volume. • apply the formulas $V = l \times w \times h$ and $V = b \times h$ for rectangular prisms to find volumes of right rectangular prisms with whole-number edge lengths in the context of solving real world and mathematical problems. • find volumes of solid figures composed of two non-overlapping right rectangular prisms by adding the volumes of the non-overlapping parts.

RESOURCES

- **Everyday Mathematics 4 Lessons:** 1-5, 1-6, 1-7, 1-8, 1-9, 1-10, 1-11, 1-12, 2-1, 2-2, 2-6, 3-3, 3-13, 4-6, 4-13, 6-6, 6-7, 8-3, 8-4 (1-11, 2-3, 2-4, 2-5, 2-7, 2-8, 2-9, 2-11, 2-12, 2-13, 3-1, 3-5, 3-7, 3-11, 3-12, 4-2, 4-4, 4-8, 5-10, 5-15, 6-6, 7-10, 7-14)
- **Supplemental Lessons:** Binder pages 21-28, 39-53, 56-87

Geometry

Graph points on the coordinate plane to solve real-world and mathematical problems.

5.G.1 Use a pair of perpendicular number lines, called axes, to define a coordinate system, with the intersection of the lines (the origin) arranged to coincide with the 0 on each line and a given point in the plane located by using an ordered pair of numbers, called its coordinates. Understand that the first number indicates how far to travel from the origin in the direction of one axis, and the second number indicates how far to travel in the direction of the second axis, with the convention that the names of the two axes and the coordinates correspond (e.g., *x*-axis and *x*-coordinate, *y*-axis and *y*-coordinate).

5.G.2 Represent real world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation.

Understandings	Essential Questions
Students will understand… • the first number in an ordered pair indicates how far to travel from the origin in the direction of one axis, and the second number indicates how far to travel in the direction of the second axis.	• Why would one graph on a coordinate plane?
Knowledge	**Skills**
Students will know . . . • a pair of perpendicular number lines, called axes, define a coordinate system, with the intersection of the lines (the origin) arranged to coincide with the 0 on each line. • a given point in the plane is located by using an ordered pair of numbers, called its coordinates. • the names of the two axes and the coordinates correspond (e.g., *x*-axis and *x*-coordinate, *y*-axis and *y*-coordinate).	Students will be able to . . . • graph points in the coordinate plane. • represent real world and mathematical problems by graphing points in the first quadrant of the coordinate plane.

RESOURCES

- **Everyday Mathematics 4 Lessons:** 4-6, 4-7, 4-8, 4-9, 4-10, 4-11, 5-2, 5-6, 5-13, 6-1, 7-10, 7-11, 7-12, 7-13, 8-2, 8-10, 8-11, 8-12 (3-10, 3-15, 4-13, 5-1, 5-3, 5-11, 6-2, 6-4, 6-11, 6-13, 7-2, 7-4, 8-6)
- **Supplemental Lessons:** Binder pages 54-87

Geometry

Classify two-dimensional figures into categories based on their properties.

5.G.3 Understand that attributes belonging to a category of two-dimensional figures also belong to all subcategories of that category. For example, all rectangles have four right angles and squares are rectangles, so all squares have four right angles.

5.G.4 Classify two-dimensional figures in a hierarchy based on properties.

Understandings	Essential Questions
Students will understand… • attributes belonging to a category of two-dimensional figures also belong to all subcategories of that category.	• How does one classify two-dimensional figures? • Why would one need to classify a two-dimensional figure?
Knowledge	**Skills**
Students will know . . . • the characteristics of figures.	Students will be able to . . . • classify two-dimensional figures in a hierarchy based on properties.

RESOURCES

- **Everyday Mathematics 4 Lessons:** 1-1, 7-5, 7-6, 7-7, 7-8, 7-9, 8-3, 8-8, 8-11, 8-12 (6-10, 6-14, 7-12, 8-6, 8-10, 8-13)
- **Supplemental Lessons:** Binder pages 5-11

Connecting the Standards for Mathematical Content to the Standards for Mathematical Practice

The Standards for Mathematical Practice describe ways in which developing student practitioners of the discipline of mathematics increasingly ought to engage with the subject matter as they grow in mathematical maturity and expertise throughout the elementary, middle and high school years. Designers of curricula, assessments, and professional development should all attend to the need to connect the mathematical practices to mathematical content in mathematics instruction.

The Standards for Mathematical Content are a balanced combination of procedure and understanding. Expectations that begin with the word "understand" are often especially good opportunities to connect the practices to the content. Students who lack understanding of a topic may rely on procedures too heavily. Without a flexible base from which to work, they may be less likely to consider analogous problems, represent problems coherently, justify conclusions, apply the mathematics to practical situations, use technology mindfully to work with the mathematics, explain the mathematics accurately to other students, step back for an overview, or deviate from a known procedure to find a shortcut. In short, a lack of understanding effectively prevents a student from engaging in the mathematical practices.

In this respect, those content standards, which set an expectation of understanding, are potential "points of intersection" between the Standards for Mathematical Content and the Standards for Mathematical Practice. These points of intersection are intended to be weighted toward central and generative concepts in the school mathematics curriculum that most merit the time, resources, innovative energies, and focus necessary to qualitatively improve the curriculum, instruction, assessment, professional development, and student achievement in mathematics.

Standards for Mathematical Practice

The Standards for Mathematical Practice describe varieties of expertise that mathematics educators at all levels should seek to develop in their students. These practices rest on important "processes and proficiencies" with longstanding importance in mathematics education. The first of these are the NCTM process standards of problem solving, reasoning and proof, communication, representation, and connections. The second are the strands of mathematical proficiency specified in the National Research Council's report *Adding It Up*: adaptive reasoning, strategic competence, conceptual understanding (comprehension of mathematical concepts, operations and relations), procedural fluency (skill in carrying out procedures flexibly, accurately, efficiently and appropriately), and productive disposition (habitual inclination to see mathematics as sensible, useful, and worthwhile, coupled with a belief in diligence and one's own efficacy).

1. Make sense of problems and persevere in solving them.

Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, "Does this make sense?" They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.

2. Reason abstractly and quantitatively.

Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to *decontextualize*—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to *contextualize*, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.

3. Construct viable arguments and critique the reasoning of others.

Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.

4. Model with mathematics.

Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.

5. Use appropriate tools strategically.

Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts.

6. Attend to precision.

Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.

7. Look for and make use of structure.

Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7×8 equals the well-remembered $7 \times 5 + 7 \times 3$, in preparation for learning about the distributive property. In the expression $x^2 + 9x + 14$, older students can see the 14 as 2×7 and the 9 as $2 + 7$. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see $5 - 3(x - y)^2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y.

8. Look for and express regularity in repeated reasoning.

Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through (1, 2) with slope 3, middle school students might abstract the equation $(y - 2)/(x - 1) = 3$. Noticing the regularity in the way terms cancel when expanding $(x - 1)(x + 1)$, $(x - 1)(x^2 + x + 1)$, and $(x - 1)(x^3 + x^2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.

Standard 9
21st Century Life and Careers

In today's global economy, students need to be lifelong learners who have the knowledge and skills to adapt to an evolving workplace and world. To address these demands, Standard 9, 21st Century Life and Careers, which includes the 12 Career Ready Practices, establishes clear guidelines for what students need to know and be able to do in order to be successful in their future careers and to achieve financial independence.

Mission: *21st century life and career skills enable students to make informed decisions that prepare them to engage as active citizens in a dynamic global society and to successfully meet the challenges and opportunities of the 21st century global workplace.*

Vision: To integrate 21st Century life and career skills across the K-12 curriculum and in Career and Technical Education (CTE) programs to foster a population that:

- Continually self-reflects and seeks to improve the essential life and career practices that lead to success.
- Uses effective communication and collaboration skills and resources to interact with a global society.
- Is financially literate and financially responsible at home and in the broader community.
- Is knowledgeable about careers and can plan, execute, and alter career goals in response to changing societal and economic conditions.
- Seeks to attain skill and content mastery to achieve success in a chosen career path.

The Standards: Standard 9 is composed of the Career Ready Practices and Standard 9.1, 9.2, and 9.3 which are outlined below:

- **The 12 Career Ready Practices**
  These practices outline the skills that all individuals need to have to truly be adaptable, reflective, and proactive in life and careers. These are researched practices that are essential to career readiness.
- **9.1 Personal Financial Literacy**
  This standard outlines the important fiscal knowledge, habits, and skills that must be mastered in order for students to make informed decisions about personal finance. Financial literacy is an integral component of a student's college and career readiness, enabling students to achieve fulfilling, financially-secure, and successful careers.
- **9.2 Career Awareness, Exploration, and Preparation**
  This standard outlines the importance of being knowledgeable about one's interests and talents, and being well informed about postsecondary and career options, career planning, and career requirements.
- **9.3 Career and Technical Education**
  This standard outlines what students should know and be able to do upon completion of a CTE Program of Study.

For students to be college and career ready they must have opportunities to understand career concepts and financial literacy. This includes helping students make informed decisions about their future personal, educational, work, and financial goals. By integrating Standard 9 into instruction, New Jersey students will acquire the necessary academic and life skills to not only achieve individual success but also to contribute to the success of our society.

21st Century Themes

Career Ready Practices describe the career-ready skills that all educators in all content areas should seek to develop in their students. They are practices that have been linked to increase college, career, and life success. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study.

CRP1. Act as a responsible and contributing citizen and employee.

CRP2. Apply appropriate academic and technical skills.

CRP3. Attend to personal health and financial well-being.

CRP4. Communicate clearly and effectively and with reason.

CRP5. Consider the environmental, social and economic impacts of decisions.

CRP6. Demonstrate creativity and innovation.

CRP7. Employ valid and reliable research strategies.

CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.

CRP9. Model integrity, ethical leadership and effective management.

CRP10. Plan education and career paths aligned to personal goals.

CRP11. Use technology to enhance productivity.

CRP12. Work productively in teams while using cultural global competence.

CRP1. **Act as a responsible and contributing citizen and employee**
Career-ready individuals understand the obligations and responsibilities of being a member of a community, and they demonstrate this understanding every day through their interactions with others. They are conscientious of the impacts of their decisions on others and the environment around them. They think about the near-term and long-term consequences of their actions and seek to act in ways that contribute to the betterment of their teams, families, community and workplace. They are reliable and consistent in going beyond the minimum expectation and in participating in activities that serve the greater good.

CRP2. Apply appropriate academic and technical skills.
Career-ready individuals readily access and use the knowledge and skills acquired through experience and education to be more productive. They make connections between abstract concepts with real-world applications, and they make correct insights about when it is appropriate to apply the use of an academic skill in a workplace situation

CRP3. Attend to personal health and financial well-being.
Career-ready individuals understand the relationship between personal health, workplace performance and personal well-being; they act on that understanding to regularly practice healthy diet, exercise and mental health activities. Career-ready individuals also take regular action to contribute to their personal financial wellbeing, understanding that personal financial security provides the peace of mind required to contribute more fully to their own career success.

CRP4. Communicate clearly and effectively and with reason.
Career-ready individuals communicate thoughts, ideas, and action plans with clarity, whether using written, verbal, and/or visual methods. They communicate in the workplace with clarity and purpose to make maximum use of their own and others' time. They are excellent writers; they master conventions, word choice, and organization, and use effective tone and presentation skills to articulate ideas. They are skilled at interacting with others; they are active listeners and speak clearly and with purpose. Career-ready individuals think about the audience for their communication and prepare accordingly to ensure the desired outcome.

CRP5. Consider the environmental, social and economic impacts of decisions.
Career-ready individuals understand the interrelated nature of their actions and regularly make decisions that positively impact and/or mitigate negative impact on other people, organization, and the environment. They are aware of and utilize new technologies, understandings, procedures, materials, and regulations affecting the nature of their work as it relates to the impact on the social condition, the environment and the profitability of the organization.

CRP6. Demonstrate creativity and innovation.
Career-ready individuals regularly think of ideas that solve problems in new and different ways, and they contribute those ideas in a useful and productive manner to improve their organization. They can consider unconventional ideas and suggestions as solutions to issues, tasks or problems, and they discern which ideas and suggestions will add greatest value. They seek new methods, practices, and ideas from a variety of sources and seek to apply those ideas to their own workplace. They take action on their ideas and understand how to bring innovation to an organization.

CRP7. Employ valid and reliable research strategies.
Career-ready individuals are discerning in accepting and using new information to make decisions, change practices or inform strategies. They use reliable research process to search for new information. They evaluate the validity of sources when considering the use and adoption of external information or practices in their workplace situation.

CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.
Career-ready individuals readily recognize problems in the workplace, understand the nature of the problem, and devise effective plans to solve the problem. They are aware of problems when they occur and take action quickly to address the problem; they thoughtfully investigate the root cause of the problem prior to introducing solutions. They carefully consider the options to solve the problem. Once a solution is agreed upon, they follow through to ensure the problem is solved, whether through their own actions or the actions of others.

CRP9. Model integrity, ethical leadership and effective management.
Career-ready individuals consistently act in ways that align personal and community-held ideals and principles while employing strategies to positively influence others in the workplace. They have a clear understanding of integrity and act on this understanding in every decision. They use a variety of means to positively impact the directions and actions of a team or organization, and they apply insights into human behavior to change others' action, attitudes and/or beliefs. They recognize the near-term and long-term effects that management's actions and attitudes can have on productivity, morals and organizational culture.

CRP10. Plan education and career paths aligned to personal goals.
Career-ready individuals take personal ownership of their own education and career goals, and they regularly act on a plan to attain these goals. They understand their own career interests, preferences, goals, and requirements. They have perspective regarding the pathways available to them and the time, effort, experience and other requirements to pursue each, including a path of entrepreneurship. They recognize the value of each step in the education and experiential process, and they recognize that nearly all career paths require ongoing education and experience. They seek counselors, mentors, and other experts to assist in the planning and execution of career and personal goals.

CRP11. Use technology to enhance productivity.
Career-ready individuals find and maximize the productive value of existing and new technology to accomplish workplace tasks and solve workplace problems. They are flexible and adaptive in acquiring new technology. They are proficient with ubiquitous technology applications. They understand the inherent risks-personal and organizational-of technology applications, and they take actions to prevent or mitigate these risks.

CRP12. Work productively in teams while using cultural global competence.
Career-ready individuals positively contribute to every team, whether formal or informal. They apply an awareness of cultural difference to avoid barriers to productive and positive interaction. They find ways to increase the engagement and contribution of all team members. They plan and facilitate effective team meetings.

Differentiation Strategies

Students with Disabilities/ Students at Risk of School Failure

(For students with disabilities, appropriate accommodations, instructional adaptations, and/or modifications should be determined by the IEP or 504 team)

Modifications for Classroom

- Pair visual prompts with verbal presentations
- Ask students to restate information, directions, and assignments.
- Give repetition and practice exercises
- Model skills/techniques to be mastered
- Give extended time to complete class work
- Provide copy of class notes
- Determine if preferential seating would be beneficial
- Provide access to a computer
- Provide copies of textbooks for home
- Provide access to books on tape/CD/digital media, as available and appropriate
- Assign a peer helper in the class setting
- Provide oral reminders and check student work during independent work time
- Assist student with long and short term planning of assignments
- Encourage student to proofread assignments and tests
- Provide regular parent/school communication

Modifications for Homework and Assignments

- Provide extended time to complete assignments
- Break down assignments
- Provide the student with clearly stated (written) expectations and grading criteria for assignments
- Implement RAFT activities as they pertain to the types/modes of communication (role, audience, format, topic)

Modifications for Assessments

- Provide extended time on classroom tests and quizzes
- Provide alternate setting as needed
- Restate, reread, and clarify directions/questions
- Distribute study guide for classroom tests
- Establish procedures for accommodations /modifications for assessments

Differentiation Strategies

Gifted and Talented

(content, process, product and learning environment)

- Allow students to pursue independent projects based on their individual interests
- Provide enrichment activities that include more advanced material
- Allow team-teaching opportunities and collaboration
- Set individual goals
- Conduct research and provide presentation of appropriate topics
- Design surveys to generate and analyze data to be used in discussion.
- Use Higher-Level Questioning Techniques
- Provide assessments at a higher level of thinking

English Language Learners

Modifications for Classroom

- Pair visual prompts with verbal presentations
- Provide repetition and practice
- Model skills/techniques to be mastered

Modifications for Homework/Assignments

- Provide Native Language Translation (peer, online assistive technology, translation device, bilingual dictionary)
- Provide extended time for assignment completion as needed
- Highlight key vocabulary
- Use graphic organizers

5th Grade Interdisciplinary Connections- Fairfield, North Caldwell, Roseland, Essex Fells- 2017

See Me in Space-A walk through the solar system

SUBJECT AREA: Science, Language Arts, Social Studies, Math, Art

A practice in scientific notation, measurement, and scale distances, this lesson plan integrates mathematics into the science curriculum. Students will apply knowledge of the properties, movements, and locations of objects in our solar system. We hope that our students will be able to recognize and elaborate on each of the planets and be able to transfer knowledge from one curricular area to the next.

http://www.learnnc.org/lp/pages/3091

Myahsteward.weebly.com

Be the Author of Your Own Problem!

SUBJECT AREA: ELA- Writing, Reading, Math, Art

Students will become authors of their own division word problems. Before writing students will brainstorm ideas and wording for their word problems. Word problems can be centered around a grade level related theme. (read-aloud book, science unit, ss unit, season etc). Students will need to write a division word problem that includes a remainder in the quotient. The final result should include: word problem, number sentence, illustration, solution, and an explanations of what they did with the remainder and why.

5th Grade Shape Sorter

SUBJECT AREA: Math, Science, ELA-Writing and Presenting, Art, Technology

Students will work in small groups to design a machine that sorts triangles and quadrilaterals. They are required to draw, describe and present their machines. Their drawing is a detailed diagram that explains how their machine sorts the shapes. The written response is a description of what happens with two different shapes as they travel through the machine. Presentations are an overview of their machine, where both teacher and classmates can ask questions.

Google Doc- directions

Design Your Own Classroom

SUBJECT AREA: Math, art, technology, ELA-Writing

Students will study interior design as a profession as well as a vocation. They will integrate their study with math, writing, and computer skills by designing a classroom of their dreams.They will learn to draw given lengths accurately. They will practice measuring to scale and convert actual to scale sizes, while integrating the geometry unit in mathematics. The students will work in small groups to integrate writing and computer technology by developing a precise description of their dream room and presenting through slides and sheets.

Google Doc-docs and rubric

Fairytale Word Problems

SUBJECT AREA: ELA- Writing, Reading, Math, Art, Technology

This lesson is a hands-on math lesson that is meant to stimulate critical thinking as well as reinforce vocabulary that is necessary to be able to create and solve word problems both on paper and on the computer. Students will be able to generate and utilize a list of math vocabulary words by identifying which operations they reflect and by using them when they create their own word problems incorporating fairytales as their LA focus . Students will be able to work cooperatively with a partner to participate in creating their own word problem and showing the work for a class book. They will first sketch out this page and then be asked to input it using Google Slides. The students will then need to present their word problems to the class via slideshow on Google Slides.

Google Docs- directions & rubric

Willis Tower

SUBJECT AREA: Math, Soc.St., LA, Art

Students apply their knowledge of volume concepts to calculate the volume of a building. The students will read and research the Willis Tower in Chicago, IL. They will work in small groups to find the volume of Willis Tower. They will need to estimate the volume of Willis Tower and make posters summarizing their work.

Everyday Math lesson 6-13

5th Grade S.T.E.A.M. Project

Unit 1

Mrs. DeSordi and Mrs. Dickson

Name:_____Date:_____Periods:_____

Task: This week, you will pretend that you have been asked by the Department of Education to design and furnish the classroom of your dreams in Churchill School. The D.O.E. graciously has given you an UNLIMITED budget! However, you MUST show all of your CALCULATIONS at the end of the project development (so be sure to show your work every step of the way in the design process).

Project Requirements (complete in your google account in "documents"):

- **Phase I**: You will work with a group to design a classroom that pupils dream about.
- **Phase II:** Decide what pieces of the present classroom should:
  - Be retained.
  - What is going into the room (and then calculate the space needed). You may use office supply catalogs to assist in the design process.
  - Your classroom may be as large or as small as you wish.
- **Phase III:** Have four to five items to share with the class including:
  - Furniture
  - Technology
  - Sink/Kitchen space.
  - Item (s) of your choice
  - Costs and totals of the above items (to be completed in sheets in your google account).
- **Phase IV:** Construct your design using some cardboard and make a model and an architectural drawing of the classroom.

Ideas to Help with the Design
Decide what aspects of the classroom are most important
What floor area and shape would you like your classroom?
Tables or desks?
Study lamps at tables or desks?
Where and how will you include technology in the room?
Would you want a comfy area: sofa, comfortable chairs, bean bags, etc. (pillow spot in the room)?

Unit 1
Mrs. DeSordi and Mrs. Dickson

Interview your teachers to find out what they have had in their classrooms and what would be even more helpful to generate some ideas.
What kinds of furniture (other than desks, tables, and chairs) will you need to support your educational environment?

Group Members:

_____

_____

____

Use the space below to begin your planning. Be creative, have fun and take LOTS OF RISKS!!!

LESSON 1

Writing Numerical Expressions

1 GETTING THE IDEA

A **numerical expression** is an expression that combines numbers and at least one operation (addition, subtraction, multiplication, or division).

$17 - 11$ $\quad 8 \div 4 + 3$ $\quad (12 + 7) \times 6$

You can translate words to numerical expressions and numerical expressions to words.

Example 1

Translate the words *the difference of 12 and 9 divided by 3* into a numerical expression.

Strategy Look for words that indicate operations.

Step 1 Underline words that represent any of the four operations.

the difference of 12 and 9 divided by 3

Step 2 Translate the meaning of each underlined word to an operation.

The word *difference* means "to subtract."

The words *divided by* mean "to divide."

Step 3 Write a numerical expression for the phrase. Use parentheses if necessary.

$$\underbrace{\text{the difference of 12 and 9}}_{(12 - 9)} \quad \underbrace{\text{divided by 3}}_{\div 3}$$

Use parentheses for the expression $12 - 9$ because the difference of the two numbers is divided by 3.

Solution $(12 - 9) \div 3$ is a numerical expression that represents *the difference of 12 and 9 divided by 3.*

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Example 2

Write the numerical expression $12 \times (5 + 3)$ in words.

Strategy **Use knowledge of operation symbols to translate the numerical expression.**

Step 1 Make a list of words you can use for each symbol or operation in the expression.

×	+
multiply	add
times	plus
multiply by	sum

Step 2 Use words from the list to write the numerical expression.

Examples:

12 times the sum of 5 and 3

add 5 and 3, then multiply by 12

multiply the sum of 5 and 3 by 12

Solution $12 \times (5 + 3)$ **can be written as** ***12 times the sum of 5 and 3.***

Example 3

Which phrase translates the numerical expression $10 \div 2 + 8$ into words?

10 divided by the sum of 2 and 8

8 more than the quotient of 10 divided by 2

10 and 2 plus 8

Strategy **Use reasoning to eliminate phrases.**

Step 1 Determine the operations used in the numerical expression and if parentheses were used.

The symbol ÷ represents division. The symbol + represents addition.

There are no parentheses in the expression.

Step 2 Use what you know to eliminate phrases. Then choose the phrase that correctly translates the expression.

~~10 divided by the sum of 2 and 8~~	Eliminate. This phrase would be true if the numerical expression read $10 \div (2 + 8)$. The numerical expression, however, does not use parentheses.
8 more than the quotient of 10 divided by 2	Correct. *8 more* means "add 8." *The quotient of 10 divided by 2* means "divide 10 by 2."
~~10 and 2 plus 8~~	Eliminate. The phrase does not include division.

Solution The numerical expression $10 \div 2 + 8$ translates to *8 more than the quotient of 10 divided by 2.*

2 COACHED EXAMPLE

Translate the numerical expression $(19 - 4) \div 5$ into words.

Identify the operations in the expression.

The $-$ symbol represents _____.

The $\div$ symbol represents _____.

Make a list of words that can be used with each symbol.

$-$	$\div$

Use words from the list to write the numerical expression.

_____

The expression $(19 - 4) \div 5$ can be written as _____

_____

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3 LESSON PRACTICE

1 Which numerical expression correctly translates the phrase 4 less than the sum of 9 and 2 ?

- ○ **A.** $9 + 2 - 4$
- ○ **B.** $9 - 4 + 2$
- ○ **C.** $4 - (9 + 2)$
- ○ **D.** $4 - 9 + 2$

2 Which of the following would **not** be translated as $24 \div (6 - 3)$?

- ○ **A.** 24 divided by the difference of 6 and 3
- ○ **B.** The quotient of 24 and 3 less than 6
- ○ **C.** 24 divided by 6 less than 3
- ○ **D.** Divide 24 by the difference of 6 and 3

3 Which numerical expression does **not** represent the statement below?

8 more than the product of 2 and 3

- ○ **A.** $8 + 2 \times 3$
- ○ **B.** $(8 + 2) \times 3$
- ○ **C.** $2 \times 3 + 8$
- ○ **D.** $(2 \times 3) + 8$

4 Mrs. Kim asked her students to interpret the numerical expression below.

$15 - (7 + 5)$

Which of the following translates the phrase correctly?

- ○ **A.** Add 7 and 5, and then subtract 15.
- ○ **B.** Subtract the sum of 7 and 5 from 15.
- ○ **C.** Subtract 7 from 15, and then add 5.
- ○ **D.** 15 less than the sum of 7 and 5.

5 Eva correctly wrote the words below as a numerical expression.

Multiply the quotient of 16 and 2 by 2

Which expression could Eva have written?

- ○ **A.** $2 \times (16 \div 2)$
- ○ **B.** $16 \times 2 + 2$
- ○ **C.** $2 \times 16 \div 2$
- ○ **D.** $2 \times 2 \div 16$

6 Which is **not** a correct way to translate the expression $10 \times (8 + 9)$?

- ○ **A.** The product of 10 and the sum of 8 and 9
- ○ **B.** The sum of 8 and 9 multiplied by 10
- ○ **C.** 10 times the sum of 8 and 9
- ○ **D.** 9 more than the product of 10 and 8

7 Write a numerical expression for the phrase below.

9 more than 18 divided by 3

8 Mr. Perez writes the phrase below on the board.

2 more than 15 divided by 3

Determine if the phrase can be translated into each of the numerical expressions.

Select Yes or No.

	$15 \div 3 + 2$	$(2 + 15) \div 3$	$15 \div (3 + 2)$	$2 + (15 \div 3)$	$3 \div (2 + 15)$
Yes	○	○	○	○	○
No	○	○	○	○	○

9 Write the numerical expression for each phrase in the table.

Phrase	Numerical Expression
20 minus 2 times 8	
Subtract 2 from 20, then multiply by 8	
28 divided by the sum of 4 and 3	
3 more than 28 divided by 4	

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10 Angie writes a numerical expression for the following phrase.

10 times the product of 5 and 4

What expression does Angie write?

11 Ramon translated a phrase into the numerical expression shown below.

$4 \times (30 + 60)$

Which phrase could he have translated? Mark all that apply.

- ○ **A.** 4 times 30 plus 60
- ○ **B.** 4 times the sum of 30 and 60
- ○ **C.** add 30 and 60, then multiply by 4
- ○ **D.** 60 more than the product of 4 and 30
- ○ **E.** the sum of 30 and 60 times 4
- ○ **F.** add 30 and 60 to 4

12 Translate the numerical expression into words.

$3 + (45 - 12)$

13 Ryan and Isabella translated the words below into a numerical expression.

5 less than the sum of 4 and 6

- Ryan wrote the numerical expression $(4 + 6) - 5$.
- Isabella wrote the numerical expression $5 - 4 + 6$.

Part A

Who wrote the numerical expression correctly? Explain your reasoning.

Part B

Translate the incorrect expression into words.

LESSON 2

Evaluating Numerical Expressions

1 GETTING THE IDEA

When you **evaluate** a numerical expression, you find the value of the expression. A numerical expression can contain several types of **grouping symbols**, including parentheses ( ), brackets [ ], and braces { }.

$$\{4 \times [10 \div (2 + 3)] + (20 - 5) \div 3\} - 7$$

Use the **order of operations** to evaluate an expression.

- Perform the operations inside parentheses first, then brackets, and then braces.
- Multiply and divide from left to right.
- Add and subtract from left to right.

Example 1

Evaluate $(8 + 12) \times (6 - 3) \div 2$.

Strategy Use the order of operations.

Step 1 Perform operations inside of parentheses.

$$(8 + 12) \times (6 - 3) \div 2$$
$$\downarrow \qquad \downarrow$$
$$20 \times 3 \div 2$$

Step 2 Multiply.

$$20 \times 3 \div 2$$
$$\downarrow$$
$$60 \div 2$$

Step 3 Divide.

$$60 \div 2$$
$$\downarrow$$
$$30$$

Solution $(8 + 12) \times (6 - 3) \div 2$ has a value of 30.

Example 2

Evaluate $48 - [(7 + 5) \times 3] \div 4 + 2 \times 11$.

Strategy Use the order of operations.

Step 1 Perform operations in parentheses.

$$48 - [(7 + 5) \times 3] \div 4 + 2 \times 11$$
$$\downarrow$$
$$48 - [12 \times 3] \div 4 + 2 \times 11$$

Step 2 Perform operations in brackets.

$$48 - [12 \times 3] \div 4 + 2 \times 11$$
$$\downarrow$$
$$48 - 36 \div 4 + 2 \times 11$$

Step 3 Start from the left side of the numerical expression. Divide first, then multiply.

$$48 - 36 \div 4 + 2 \times 11$$
$$\downarrow \quad \downarrow$$
$$48 - 9 + 22$$

Step 4 Start from the left side of the numerical expression. Subtract first, then add.

$$48 - 9 + 22$$
$$\downarrow$$
$$39 + 22$$
$$\downarrow$$
$$61$$

Solution $48 - [(7 + 5) \times 3] \div 4 + 2 \times 11$ has a value of 61.

Example 3

Evaluate $8 + \{3 \times [21 \div (3 + 4)] + 1\}$.

Strategy Use the order of operations.

Step 1 Perform operations in parentheses.

$$8 + \{3 \times [21 \div (3 + 4)] + 1\}$$
$$\downarrow$$
$$8 + \{3 \times [21 \div 7] + 1\}$$

Step 2 Perform operations in brackets.

$$8 + \{3 \times [21 \div 7] + 1\}$$
$$\downarrow$$
$$8 + \{3 \times 3 + 1\}$$

Step 3 Perform operations in braces. Multiply, then add.

$$8 + \{3 \times 3 + 1\}$$
$$\downarrow$$
$$8 + \{9 + 1\}$$
$$\downarrow$$
$$8 + 10$$

Step 4 Add.

$$8 + 10$$
$$\downarrow$$
$$18$$

Solution $8 + \{3 \times [21 \div (3 + 4)] + 1\}$ has a value of 18.

Example 4

Which expression has a value of 12?

$3 + 12 \times 5 \div (5 + 15)$

$18 \div [3 \times (7 - 5)] \times 4$

$6 \div 2 \times \{10 + [24 \div (3 + 5)] - 12\}$

Strategy Evaluate each numerical expression using the order of operations.

Step 1 Evaluate $3 + 12 \times 5 \div (5 + 15)$.

$3 + 12 \times 5 \div (5 + 15)$

$3 + 12 \times 5 \div 20$

$3 + 60 \div 20$

$3 + 3$

6

Step 2 Evaluate $18 \div [3 \times (7 - 5)] \times 4$.

$18 \div [3 \times (7 - 5)] \times 4$

$18 \div [3 \times 2] \times 4$

$18 \div 6 \times 4$

3×4

12

Step 3 Evaluate $6 \div 2 \times \{10 + [24 \div (3 + 5)] - 12\}$.

$6 \div 2 \times \{10 + [24 \div (3 + 5)] - 12\}$

$6 \div 2 \times \{10 + [24 \div 8] - 12\}$

$6 \div 2 \times \{10 + 3 - 12\}$

$6 \div 2 \times 1$

3×1

3

Solution The expression $18 \div [3 \times (7 - 5)] \times 4$ has a value of 12.

2 COACHED EXAMPLE

Evaluate $\{4 \times [18 \div (2 + 4)] + (24 - 9) \div 3\} - 7$.

The order of operations for this numerical expression is:

First: perform operations in _____

Second: perform operations in _____

Third: perform operations in _____

Last: _____

$\{4 \times [18 \div (2 + 4)] + (24 - 9) \div 3\} - 7$

_____

_____

_____

_____

_____

The value of $\{4 \times [18 \div (2 + 4)] + (24 - 9) \div 3\} - 7$ is _____.

1. Which of the following steps would Raj **not** use when evaluating the expression $(6 + 3) - 4 \times 2$ using the order of operations?

   ○ **A.** Subtract 4 from the sum of 6 and 3.

   ○ **B.** Multiply 4 and 2.

   ○ **C.** Subtract the product of 4 and 2 from the sum of 6 and 3.

   ○ **D.** Add 6 and 3.

2. Which numerical expression has a value of 45?

   ○ **A.** $2 + 3 \times 6 + [(9 \times 5) \div 3]$

   ○ **B.** $20 + 3 \times [5 + (30 \div 3)]$

   ○ **C.** $15 - 5 \times 2 + [4 \times (3 + 5) + 8]$

   ○ **D.** $15 \times [13 - (7 + 3) \div 2 - 4]$

3. What is the value of the expression below?

   $$[(4 + 8) \div 2] - 4 + 7 \times 3$$

   ○ **A.** 15

   ○ **B.** 23

   ○ **C.** 25

   ○ **D.** 27

4. Amelia inserted parentheses to the numerical expression $12 \div 2 + 4 \times 3 + 5$ so that the value of her expression was 16. Which of the following shows where Amelia inserted the parentheses?

   ○ **A.** $12 \div 2 + 4 \times (3 + 5)$

   ○ **B.** $12 \div (2 + 4) \times (3 + 5)$

   ○ **C.** $12 \div (2 + 4) \times 3 + 5$

   ○ **D.** $12 \div 2 + (4 \times 3) + 5$

5. Which numerical expression has a value of 10?

   ○ **A.** $(11 - 6) \times 4 \div 2$

   ○ **B.** $(10 + 50) \div (5 - 2)$

   ○ **C.** $14 \div 7 \times (4 + 2)$

   ○ **D.** $25 - [2 \times (18 \div 6) + 1]$

6. Juanita evaluated the numerical expression below.

   $$4 + 28 \div [2 \times (7 - 5)]$$

   Which step should she perform first?

   ○ **A.** Subtract 5 from 7.

   ○ **B.** Multiply 7 by 2.

   ○ **C.** Add 4 and 28.

   ○ **D.** Divide 28 by 2.

7 Ling wrote a numerical expression that has a value of 18. Select numerical expressions that Ling could have written. Mark all that apply.

- ○ **A.** $36 \div [7 - (3 + 2)]$
- ○ **B.** $6 \times (7 + 3) \div 5 - 42 \div (13 - 6)$
- ○ **C.** $25 \div [(12 - 9) + 2] \times 6 - 3$
- ○ **D.** $18 - 4 \times (13 - 9) + 16$
- ○ **E.** $15 \times 2 - 24 \div (11 - 3) - 2 \times 3$
- ○ **F.** $30 - [(8 - 5) \times 3] + 32 \div 8 - 7$

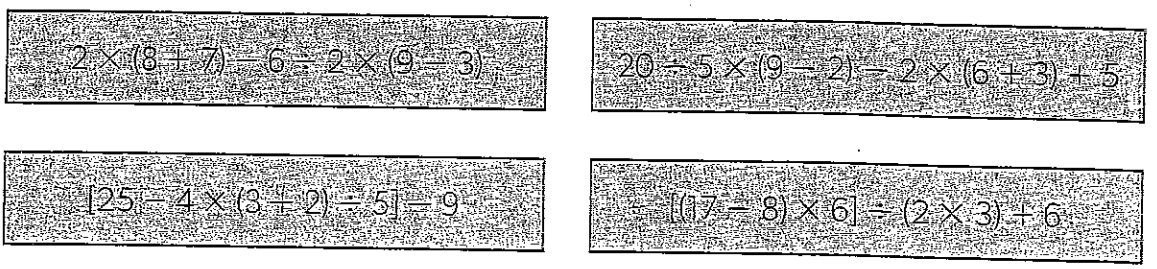
8 Evaluate the expression below.

$$24 \div [15 - (7 + 2) \div 3 - 4]$$

9 Write the value for each expression in the table.

Expression	Value
$\{[7 + (8 - 3) \times 2] - 5\} + 10$	
$10 + 5 \times [(3 + 21) \div 3]$	
$(8 - 6) \times (3 + 15) \div 3 + 10$	
$2 \times (12 \div 4) + [16 \div (9 - 7)]$	

10 Evaluate each expression. Write the expression in the correct box.



12	15

11 Mario ordered new T-shirts for the table tennis team. He bought 6 medium T-shirts and 2 large T-shirts. Each medium T-shirt cost $7 and each large T-shirt cost $9.

Mario received a $4 discount. The final cost of the T-shirts was divided evenly by the 8 members of the team. How much will each team member will pay?

Each team member will pay $\square$.

12 Luke and Andrea evaluated the numerical expression below.

$$(3 + 5) \times 7 - [10 + (45 - 15) \div 5]$$

Luke said that the numerical expression has a value of 48. Andrea said that it has a value of 40. Which student is correct? Describe a possible error that one of the students could have made.

13 Hailee inserted one set each of parentheses, brackets, and braces in the expression below. The expression has a value of 9.

$$7 \times 20 \div 11 - 9 + 2 \div 8$$

Part A

Write one way that Hailee can insert the grouping symbols.

Part B

Explain the strategy you used to insert the grouping symbols.

5.OA Why Do We Need an Order of Operations?

Task

a. State the meaning of each of the following expressions and draw a picture that represents it.

$$(3 \times 5) + 4$$

$$3 \times (5 + 4)$$

b. State the meaning of this expression:

$$3 \times 5 + 4$$

How do you know?

c. State the meaning of each of the following expressions and draw a picture that represents it.

$$(3 + 5) \times 4$$

$$3 + (5 \times 4)$$

d. State the meaning of this expression:

$$3 + 5 \times 4$$

How do you know?

5.OA Why Do We Need an Order of Operations?
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CW

Name _____ Date _____

Comparing Whole Number Place Values

hundred billion	ten billions	billions	hundred millions	ten millions	millions	hundred thousands	ten thousands	thousands	hundreds	tens	ones
Billions			Millions			Thousands			Ones		

BRING HOME MARBLE NOTEBOOK FOR HELP!!!!!

Use the number 78,866 to complete the sentences below. Use the chart above for help.

1. The value of the ones digit is _____.

2. The value of the tens digit is _____.

Comparison

3. The value of the _____ in the ones place is _____ the value of _____ in the place to its left.

4. The values of the thousands place is _____.

5. The value of the hundreds place is _____.

Comparison

6. The value of the _____ in the thousands place is _____ as much as _____ in the place to its right.

7. With each place we move to the right on the place value chart, numbers become _____ the value.

8. With each place we move to the left on the place value chart, numbers become _____ as much.

Answer questions 9 - 12 using the following phrases. Use the chart above for help.

- **100 times as much**
- **1/10 of the value**
- **1/100 of the value**
- **10 times as much**

9. How much larger is 70 than 7?

10. How much smaller is 80 than 800?

11. How much smaller is 40 than 4,000

12. How much larger is 3,000,000 than 30,000

Look at each comparison of the digits in the 558,576. Is the comparison correct? Select yes or no.

13. 500,000 is 10 times as much as 50,000	yes	no
14. 500 is 1/10 of 50,000	yes	no
15. 500,000 is 1,000 times as much as 500	yes	no
16. 50,000 is 1/100 the value of 500,000	yes	no

17. Circle <u>one</u> number from <u>each box</u> to make the statement true.

50 5 5,000 500	is 1/10 of	1 5 5,000 500	.	6 60 600	is 10 times as much as	6,000 60 60,000	.

HW → use marble for help.

Name _____ Date _____

Comparing Whole Number Place Values

hundred billion	ten billions	billions	hundred millions	ten millions	millions	hundred thousands	ten thousands	thousands	hundreds	tens	ones
Billions			Millions			Thousands			Ones		

Compare the values in 99,999. Select true or false for each statement.

1. 90 is 1/10 of 9 True False
2. 9,000 is ten times as much as 900 True False
3. 90,000 is 1/10 of 900,000 True False
4. 9,000 is equivalent to 9×10^4 True False
5. 9,000 is 100 times as much as 90 True False

6. **Compare the values of the digits in 55,423. Use the tiles to write <u>two different</u> comparisons. Numbers or phrases may be used more than once, or not at all.**

is 10 times as much	400	5,000	3
is $\frac{1}{10}$ of	50,000	500	20

7. WOW!! Michael saved 6,233 math tickets. Write a statement that compares the values of the ones and the tenths digits.

8. Madison said that the value of the 8 in hundreds place of 12,881 is 1/10 the value of the 8 in the tens place. Is Madison's statement correct? Explain why or why not.

9. For each number in the table, chose a phrase from the box to complete the comparison. Phrases may be used more than once or not at all.

Number	Phrase
300	
3	
3,000	
30	
30,000	

Is 10 times as much as 300
Is 1/10 the value of 30
Is 1/10 the value of 300
Is 10 times as much as 3,000
Is 100 times as much as 3

Name _____ Date _____

Write two different comparisons for the 8s in the number below. Use the given phrases/words as needed. Keep in mind, that not all phrases/words will be used.

1,209.886

1/10 the value	Hundreds	10 times larger	Thousandths
Tenths	Hundredths	100 times as much	

_____

_____

_____

_____

Name _____ Date _____

Expanded Form Review
(5th Grade Style!)

Write the following numbers in expanded form using base ten.
(example: 278 = 2 x 100 + 7 x 10 + 8 x 1)

1) 65,102

_____

2) 307,076

_____

3) 963

_____

4) Create a number using your birthday (Ex: 03/12/82 = 31,282) Don't forget to expand it!

_____

Complete the table below using your knowledge of the powers of ten. You can use your marble for help.
(Example: million = 1,000,000 = 10^6 because the one is following by 6 zeros)

Place Value	Value	Power of 10
Thousand		
	100	
		10^1
Hundred Million		
	1,000,000,000	
		10^{11}

Use your marble for help! ☺

Write the following numbers in expanded form using powers of 10.
(Example: million = 1,000,000 = 10^6 because the one is following by 6 zeros)

5) 5,003,790

---

6) 20,560,008,234

---

7) 689,003

---

8) Create a number using your phone number. ex: 9,735,511,234 (973-551-1234)

Using your knowledge of place value, select the best answer choice. Make sure to read each one carefully, and eliminate any unreasonable answers.

9) Which of the following is NOT the correct way to write 2,908 in expanded form.

a) 2,000 + 900 + 8
b) 2 x 1000 + 9 x 10 + 8 x 1
c) $2 \times 10^3 + 9 \times 10^2 + 8 \times 10^0$
d) 2 x 1000 + 9 x 100 + 8 X 1

10) Choose the smallest number.

a) one billion, six thousand, twenty-seven
b) $1 \times 10^{11} + 6 \times 10^3 + 2 \times 10^1 + 7 \times 10^0$
c) 1,000,000 + 6,000 + 20 + 7
d) 1 x 1,000,000,000 + 6 x 100 + 2 x 10 + 7 x 1

11) Which number is 10 times larger than ten thousand?

a) one million
b) one thousand
c) hundred thousand
d) ten million

12) Select all the numbers that are larger than 999,999,999

a) 10^{10}
b) one million
c) 9 X 1,000,000,000
d) 900,000,000 + 90,000,000 + 9,000,000 + 900,000 + 90,000 + 9,000 + 900 + 90 + 9

13) Which is of the following is the product of 327 and 18.

a) 5,876
b) $5 \times 10^2 + 8 \times 10^1 + 6 \times 10^0$
c) 5,000 + 800 + 80 + 6
d) five thousand, six hundred eighty-eight

Fractionated Fairy Tales

Assignments and Guidelines:

You are to write 5 story problems that are based on fairy tales. They may be short sections of a fairy tale, or you may become ambitious and make a long story problem out of a tale.The following is a list of criteria:

1. You are to write five multi-step story problems based on fairy tales and fairy-tale characters.
2. These fairy-tale story problems may involve one or several of the processes of addition, subtraction, multiplication, and division.
3. Your problems should require operations involving whole numbers, fractions, decimals, percents, or any combination of these.
4. You will first write you problems in draft form on loose-leaf paper. Then you will create a slideshow of the five problem in Google Slides (incorporate some graphics.)
5. You will use Google Docs to type the problems with the process and solutions to show exactly how you solved them (The Answer Sheet).
6. Be prepared to share with the class-choose one of the problems that you would like for everyone to solve.

Example:

Once upon a time, there were three little pigs. They all decided to go off on their own, because their parents decided they were old enough and furthermore, they were getting on Papa Piggy's nerves. Off they went, one bright sunny morning, but they suddenly realized they had no place to live. The first little pig, whose name was Harold, decided to build a house out of wood. He did a little figuring, got all his money together (which was $459.29) and went bounding off to the local building supply store. He got a large cart and picked up the following items.:

12 ⅛, one- by- six inch boards	*@$12.95 each*
14 ⅔ , two-by-four- inch boards	*@$10.59 each*
5 ¾, boxes of three-penny nails	*@$3.95 each*
3 ½, boxes of floor tile	*@$23.65 each*
2 ½, gallons of paint	*@$12.50 each*

If he needed at least $45.00 for food, did he have enough money to build the house and buy food? If not, how much money did he need to make up the difference?

Fractionated Fairy Tales Rubric

Name_____

	4	3	2	1
Word Problems • Five problems. • Multi-step problems. • Based on fairy-tale or character. • Variety of operations. • Variety of types of numbers(whole, fractions, decimals etc.)	All 5 items	4 items	2-3 items	1 item
Slide show • Five slides. • Transition of slides. • Graphic designs on slides. • Lively Presentation	4 items	3 items	2 items	1 item
Google Docs • Word problems with no errors. • Clear solutions to the problems. • Step by step solutions • Correct answers.	4 items	3 items	2 items	1 item
Presentation • Audible (loud, clear voice.) • Facing the audience. • Turn taking with group. • Eye contact with audience.	4 items	3 items	2 items	1 item
Participation • Polite behavior during presentations. • Solving problems from other students. • Working together during project. • Turn taking with group.	4 items	3 items	2 items	1 item

Total Points_____ Grade_____ 20=A+ 19-16=A 15-11=A- 10-6=B+ 5-3=B 2-0=B-

LESSON 6

Reading and Writing Decimals

1 GETTING THE IDEA

Decimals can be written in different ways, just like whole numbers.

Standard form 25.347

Word form twenty-five and three hundred forty-seven thousandths

Expanded form $2 \times 10 + 5 \times 1 + 3 \times \frac{1}{10} + 4 \times \frac{1}{100} + 7 \times \frac{1}{1{,}000}$

Remember that expanded form is a way of writing a number as a sum of the values of its digits.

You can use place value to help you write a decimal in different ways.

Example 1

The Seikan Tunnel in Japan is the longest underwater tunnel in the world. It is 53.108 kilometers long. Write the word form for 53.108 kilometers.

Strategy Use a place-value chart.

Step 1 Write the number in a place-value chart.

Hundreds	Tens	Ones	·	Tenths	Hundredths	Thousandths
	5	3	·	1	0	8

Step 2 Write the word form for the whole-number part. Write *and* for the decimal point.

fifty-three and

Step 3 Write the word form for the decimal part. Use the name of the last decimal place to name the decimal.

fifty-three and one hundred eight thousandths

Solution **The word form for 53.108 kilometers is fifty-three and one hundred eight thousandths kilometers.**

Example 2

Write the standard form and expanded form of two hundred forty-five and thirteen thousandths.

Strategy Use a place-value chart.

Step 1 Write the decimal in a place-value chart.

The word *thousandths* tells you that the last digit is in the thousandths place.

Use a zero as a placeholder for tenths. Use a decimal point for the word *and*.

Hundreds	Tens	Ones	·	Tenths	Hundredths	Thousandths
2	4	5	·	0	1	3

Step 2 Write the value of each digit in the place-value chart.

Hundreds	Tens	Ones	·	Tenths	Hundredths	Thousandths
2	4	5	·	0	1	3
2×100	4×10	5×1		$0 \times \frac{1}{10}$	$1 \times \frac{1}{100}$	$3 \times \frac{1}{1{,}000}$

Step 3 Write the decimal in expanded form as the sum of the values of the digits.

$$2 \times 100 + 4 \times 10 + 5 \times 1 + 1 \times \frac{1}{100} + 3 \times \frac{1}{1{,}000}$$

It is not necessary to write the value of a zero in a number.

Solution In standard form, the decimal is 245.013. In expanded form, it is $2 \times 100 + 4 \times 10 + 5 \times 1 + 1 \times \frac{1}{100} + 3 \times \frac{1}{1{,}000}$.

Example 3

A number written in expanded form is $3 \times 10 + 8 \times 1 + 9 \times \frac{1}{10} + 2 \times \frac{1}{1{,}000}$. Which of the following shows the standard form?

38.92 30.892 38.902 3,892

Strategy Interpret the expanded form.

Step 1 Determine the value of each addend in the expanded form.

$$3 \times 10 + 8 \times 1 + 9 \times \frac{1}{10} + 2 \times \frac{1}{1{,}000}$$

↑ ↑ ↑ ↑

3 tens 8 ones 9 tenths 2 thousandths

Step 2 Check if there are any missing place values.

No hundredths are shown between tenths and thousandths.
So, there are 0 hundredths.

Step 3 Write the number that has the digits with the same values.

The number 38.902 has 3 tens, 8 ones, 9 tenths, 0 hundredths, and 2 thousandths.

Solution The standard form of $3 \times 10 + 8 \times 1 + 9 \times \frac{1}{10} + 2 \times \frac{1}{1{,}000}$ is 38.902.

2 COACHED EXAMPLE

A bakery produced 163.584 kilograms of bread on Monday. Write the word form and expanded form for this number.

First, write the word form for 163.584.

The word form for the whole-number part is _____.

Write the word _____ for the decimal point.

The last digit in 163.584 is in the _____ place.

So, the word form for the decimal part is _____.

Next, write the expanded form of 163.584.

Complete the place-value chart.

Hundreds	Tens	Ones	·	Tenths	Hundredths	Thousandths
$\square \times 100$	$\square \times 10$	$\square \times 1$		$\square \times \frac{1}{10}$	$\square \times \frac{1}{100}$	$\square \times \frac{1}{1{,}000}$

The word form for 163.584 is _____

_____.

The expanded form for 163.584 is _____

_____.

1. Which is the standard form of the number below?

$4 \times 100 + 1 \times \frac{1}{10} + 2 \times \frac{1}{1{,}000}$

○ **A.** 400.102 ○ **C.** 401.2

○ **B.** 400.12 ○ **D.** 412

2. What is the expanded form of the number 50.02?

○ **A.** $5 \times 1 + 2 \times \frac{1}{100}$

○ **B.** $5 \times 10 + 2 \times 1$

○ **C.** $5 \times 10 + 2 \times \frac{1}{10}$

○ **D.** $5 \times 10 + 2 \times \frac{1}{100}$

3. What is the word form of 3.051?

○ **A.** three thousand fifty-one

○ **B.** three and fifty-one hundredths

○ **C.** three and fifty-one tenths

○ **D.** three and fifty-one thousandths

4. What is the standard form of the number below?

twenty-six and thirty-four hundredths

○ **A.** 26.034

○ **B.** 26.304

○ **C.** 26.34

○ **D.** 26,340.0

5. Which is another way to write the decimal 30.425?

○ **A.** $30 \times 10 + 4 \times 100 + 2 \times 10 + 5 \times 1$

○ **B.** thirty and four hundred twenty-five thousandths

○ **C.** $3 \times 10 + 4 \times 1 + 2 \times \frac{1}{10} + 5 \times \frac{1}{100}$

○ **D.** thirty and four hundred twenty-five

6. Which is a true statement?

A. three hundred twenty-four and sixty-eight hundredths is equal to 324.068

B. $596.104 = 5 \times 100 + 9 \times 10 + 6 \times 1 + 4 \times \frac{1}{1{,}000}$

C. $2 \times 100 + 7 \times 10 + 5 \times 1 + 3 \times \frac{1}{100} + 6 \times \frac{1}{1{,}000}$ is equal to two hundred seventy-five and 306 thousandths

D. 803.542 is equal to eight hundred three and five hundred forty-two thousandths

7 The longest snake in captivity has a weight of about three hundred fifty and ninety-four thousandths pounds. Write the weight of the snake in standard form.

[ ] pounds

8 Determine whether each word form or expanded form represents a 5-digit decimal or a 6-digit decimal. Write the word form or expression in the correct box.

forty-two and six thousandths	$3 \times 100 + 7 \times 1 + 1 \times \frac{1}{10} + 9 \times \frac{1}{100}$
one hundred eighty and thirty-two thousandths	$2 \times 10 + 6 \times 1 + 5 \times \frac{1}{10} + 4 \times \frac{1}{1{,}000}$

5-Digit Decimals	6-Digit Decimals

9 Dan is writing a report on snowfall in Alaska. Valdez, Alaska, receives an average of 305.8 inches of snow each year. Dan found that this measurement is the same as 776.732 centimeters. Write the number of centimeters in word form.

10 Which of the following shows the values of the digits in six hundred three and five hundred eighty-two thousandths? Mark all that apply.

- ○ **A.** $5 \times \frac{1}{10}$
- ○ **B.** 6×100
- ○ **C.** 8×10
- ○ **D.** $2 \times \frac{1}{1{,}000}$
- ○ **E.** 3×1
- ○ **F.** $8 \times \frac{1}{100}$

11 Yoshi wrote the standard form for three hundred sixty and nine hundred seven thousandths. Kim wrote a number with 3 more ones and 7 less tenths. What number did Kim write?

Use the place-value chart to help you write the number.

Hundreds	Tens	Ones	.	Tenths	Hundredths	Thousandths

Kim wrote _____.

12 Kate wrote *nine hundred twenty and forty-seven hundredths* as the word form for 920.047. Is her work correct? Explain why or why not.

13 Suzi races on her bicycle. She recorded her times for 3 sprints.

Sprint	Time (in seconds)
1	fifty and five hundred sixty-four thousandths seconds
2	2 hundredths of a second slower than Sprint 1
3	3 tenths of a second faster than Sprint 2

Part A

Write the expanded form of Suzi's first sprint.

Part B

Explain how to use the expanded form of the time from Suzi's first sprint to find Suzi's time on her second sprint.

Part C

What was Suzi's time for her third sprint? Explain how you found your answer.

5.NBT Are these equivalent to 9.52?

Task

Isaiah is thinking of the number 9.52 in his head. Decide whether each of these has the same value as 9.52 and discuss your reasoning.

a. Nine and fifty-two tenths

b. 9 + 0.5 + 0.02

c. 9 ones + 5 tenths + 2 hundredths

d. $(9 \times 1) + \left(5 \times \frac{1}{10}\right) + \left(2 \times \frac{1}{100}\right)$

e. 952 tenths

f. 952 hundredths

5.NBT Are these equivalent to 9.52?
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Name _____ Date _____

1. **Complete the 15 digit number below using the given clues.**

___ ___ ___, ___ ___ ___, ___ ___ ___, ___ ___ ___ . ___ ___ ___

- 5 in the tens place
- 3 in the thousands place
- 8 in the hundredths place
- 4 in the thousandths place
- 7 in the hundred billions place
- Fill the rest of the place values with zeros

1a. Write the number you created above in word form.

2. **The weight of an Africa Rhinoceros is 6,067.104 pounds. Write its weight in base ten expanded form.**

3. **Claudia is thinking of the number 9.52 in her head. Circle <u>all the ways</u> she could write that number so that it would have the same value.**

a. Nine and fifty two tenths

b. 9.520

c. $9 + 0.5 + 0.02$

d. $9 \times 1 + 5 \times 1/10 + 2 \times 1/100$

e. Nine and fifty-two hundredths

f. $9 \times 1 + 5 \times 1/00 + 2 \times 1/1000$

4. **Choose the largest number.**

a) 1 billion, 53 million, forty-nine

b) 1,000,000 + 50,000 + 3,000 + 40 + 9

c) $1 \times 10^{10} + 5 \times 10^{7} + 3 \times 10^{6} + 4 \times 10^{1} + 9 \times 10^{0}$

d) 1,530,049

5. **Celeste wrote a comparison for the 4's in the number 24.401. She used one of the phrases below. What statement could Celeste make about those two numbers?**

10 times the value	1/10 the size

6. **Circle the pair of numbers where the 4 in the first number is 10 times larger than the 4 in the second number.**

a) 4,309 and 1,240

b) 1,450 and 2,499

c) 8,471 and 2,843

d) 4,602 and 1,234

7. **Which number shows a 7 that is 1/10 the size of the 7 in 907.32.**

a) 712.3

b) 11.709

c) 37.5

d) 101.007

8) **.09 is ten times the value of .9** **True or False**

9) Dominick wanted to demonstrate the size of a decimal using base ten blocks. Using the large cube as one, model the number below two different ways.

3.027

10) Order the numbers below from greatest to least.

4.2	4.021	4.01	4.123

11) Complete the inequalities below:

a. .901 _____ .91

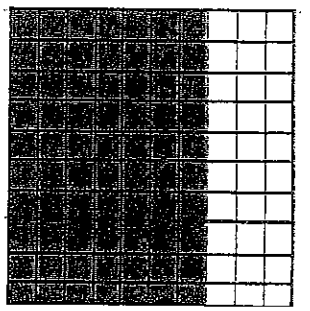
b. 1,354.02 _____ 345.99

c. .6 _____ 0.600

d. 123.49 _____ 123.475

12) Dante was trying to explain to a fourth grader that .4 and .400 are equivalent. What should he include in his explanation?

13) Use the model below to complete the sentence. Be sure to write your answer in word form.



The decimal shown here is _____, and it is

equivalent to _____.

14) Circle all the numbers that 89.372 could be rounded to.

89

90

89.38

89.4

89.37

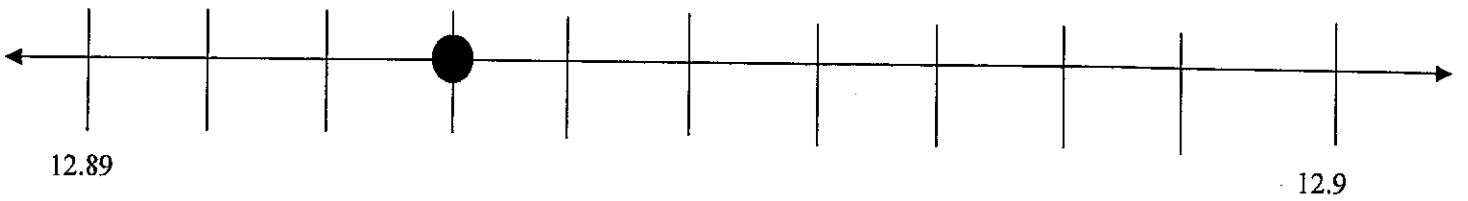
15) Mr. Gesario rounded the height of his Lego tower to 12.25 inches. What could the height have been before he rounded it?

_____

16) Round 20.56 to the nearest whole number. _____

17) Round 1,389.541 to the greatest place value. _____

18) Identify the decimal on the number line below.

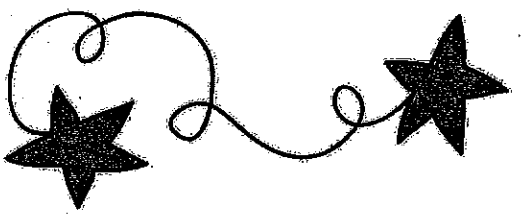


_____

Extra Credit

1. Identify two numbers whose sum is 25. You cannot use whole numbers.

2. Find the difference between 100 and 15.75



Pick and solve

A. What could 13.1 have been before it was rounded?	B. What could 45.9 be rounded to? 100 50 40 45 46	C. Write 2,008,000.13 in expanded form	D. Write 9,000,001.012 in word form	E. Model the decimal 2.53 using the large cube as one.
F. Compare 13.491 and 13.439. How do you know which one is larger?	G. Order the following form greatest to least: 6.78 6.7 6.08 6.871	H. Name a decimal equivalent to 2.98. Explain why it is equivalent.	I. Compare 30.901 and 30.91. How do you know which one is larger?	J. $3 \times 10^2 + 4 \times 1/100 + 5 \times 1/1000 =$
K. Compare the 9s in the number below. 129.932.	L. True or False .04 is 1/10 of .4	M. True or False 30 is 10 times the value of 3	N. Name a decimal between .09 and .10	O. What place value would you round 23.093 to , and it would appear the largest?
P. What could 23 have been before it was rounded?	Q. Write 10,005,009.023 in word form	R. Write an equivalent to .4 in word form	S. Model 6.203 two ways if the large block is one.	T. What place value would you have to move the 3 to so that it would become 1/10 the size? 12.322

Pick and solve

A. What could 894.3 have been before it was rounded?	B. What could 26 been before it was rounded?	C. Round 10.987 to the nearest whole number.	D. What could 83.75 be rounded to? 90 80 84 83 83.8 83.7	E. What could 4.708 be rounded to? 5 4 4.7 4.71 4.72
F. Write 1,098.304 in expanded form	G. Write 100,009,305.2 in word form.	H. Compare 2.345 and 2.43. How do you know which one is larger?	I. Name a decimal equivalent to 15.3. Explain why it is equivalent	J. $2 \times 10^4 + 3 \times 1/100 =$
K. What is the farther, 12.09 miles or 12.091 miles?	L. Model the decimal 2.904 is the large cube is one.	M. Order the following from least to greatest: .23 2.3 .02 .2 .031	N. Name a decimal in between 1.26 and 1.27	O What place value could you round 16.278 to, and it would appear the largest?
P. Write three billion, seven thousand and five hundredths in standard form.	Q. Write 4,509.013 in expanded and word form.	R. Explain why .456 is smaller than .461.	S. Model 3.041 two ways using the large cube as one.	T. $2 \times 100 + 2 \times 1/10 + 2 \times 1/1000 =$

LESSON 8

Rounding Decimals

1 GETTING THE IDEA

When you **round** a number, you are finding a number close to the exact number.

To round 9,367 to the nearest thousand, first find the digit in the rounding place. Then look at the digit to the right of the rounding place. Underline that digit.

- If that digit is less than 5, then the digit in the rounding place stays the same. Change the digits to the right to 0s.
- If that digit is 5 or greater, then the digit in the rounding place is increased by 1. Change the digits to the right to 0s.

Thousands	Hundreds	Tens	Ones
9	3	6	7

Because 3 is less than 5, the digit in the thousands place stays the same.
So, 9,367 rounded to the nearest thousand is 9,000.

This same process can be used to round decimals.

Example 1

The largest grasshopper in Australia is the Giant Grasshopper. It can grow to a length of 3.457 inches. Round the length of the Giant Grasshopper to the nearest inch.

Strategy **Use a place-value chart.**

Step 1 Determine to which place you need to round.

When you round to the nearest inch, you want a whole number measurement. Rounding to the nearest inch means to round to the ones place.

Step 2 Write the number in a place-value chart.

Hundreds	Tens	Ones		Tenths	Hundredths	Thousandths
		3	.	4	5	7

Step 3 Find the digit in the rounding place. Underline the digit to the right of the rounding place.

Hundreds	Tens	Ones	.	Tenths	Hundredths	Thousandths
		3	.	4	5	7

Step 4 Look at the underlined digit. Decide what to do with the digit in the rounding place.

Because 4 is less than 5, the digit in the rounding place stays the same.
Then change digits to the right to 0s or drop the digits.
3.457 rounded to the nearest whole number is 3.000 or 3.

Solution **The length of the Giant Grasshopper rounded to the nearest inch is 3 inches.**

Example 2

A grasshopper can jump up to 20 times the length of its body. One grasshopper jumped 508.97 centimeters. What is the length of this jump to the nearest tenth of a centimeter?

Strategy **Use place value.**

Step 1 Find the digit in the rounding place. Underline the digit to the right of the rounding place.

508.97

Step 2 Look at the underlined digit. Decide what to do with the digit in the rounding place.

Because 7 is greater than 5, increase the digit in the rounding place by 1.
9 tenths + 1 tenth = 10 tenths, or 1 one
Add 1 to the ones digit and change the digits to the right to 0s,
or drop the hundredths digit.
508.97 rounded to the nearest tenth is 509.00 or 509.0.

Solution **The length the grasshopper jumped rounded to the nearest tenth of a centimeter is 509.0 centimeters.**

Example 3

Round 39.635 to the nearest tenth and to the nearest hundredth. How do the rounded numbers compare?

Step 1 Round 39.635 to the nearest tenth.

39.6<u>3</u>5 $3 < 5$, so the tenths digit stays the same. Drop the digits to the right.

39.635 rounded to the nearest tenth is 39.6.

Step 2 Round 39.635 to the nearest hundredth.

39.63<u>5</u> The underlined digit is 5, so increase the hundredths digit by 1. Drop the digit to the right.

39.635 rounded to the nearest hundredth is 39.64.

Step 3 Compare the rounded numbers.

Rounded to the nearest tenth ↓ **39.6** $<$ 39.635 $<$ **39.64** ↓ Rounded to the nearest hundredth

When rounded to the nearest tenth, 39.635 rounds to a lesser number. When rounded to the nearest hundredth, 39.635 rounds to a greater number.

Both numbers are close to 39.635.
39.64 is closer to 39.635 than 39.6 is.

Solution **39.635 rounded to the nearest tenth is 39.6, and 39.635 rounded to the nearest hundredth is 39.64. Rounding to the nearest hundredth results in a number closer to the original number than rounding to the nearest tenth.**

COACHED EXAMPLE

Round 18.706 to the nearest whole number and to the nearest hundredth. How do the rounded numbers compare?

Rounding to the nearest whole number is the same as rounding to the _____ place.

To round 18.706 to the nearest whole number, find the digit in the _____ place.

Underline the digit in the _____ place.

_____ ◯ 5, so _____.

18.706 rounded to the nearest whole number is _____.

To round 18.706 to the nearest hundredth, find the digit in the _____ place.

Underline the digit in the _____ place.

_____ ◯ 5, so _____.

18.706 rounded to the nearest hundredth is _____.

18.706 rounded to the nearest whole number is _____.

18.706 rounded to the nearest hundredth is _____.

18.706 rounded to the nearest _____ is closer to 18.706 than the number rounded to the nearest _____.

1. An elephant at an African wildlife reserve weighed 237.584 pounds at birth. Which statement about the weight of the elephant is **not** true?

   ○ **A.** The weight rounded to the nearest hundredth is 237.58.

   ○ **B.** The weight rounded to the nearest ten is 240.

   ○ **C.** The weight rounded to the nearest tenth is 237.5.

   ○ **D.** The weight rounded to the nearest hundred is 200.

2. Which decimal represents 43.597 rounded to the nearest hundredth?

   ○ **A.** 43.50

   ○ **B.** 43.598

   ○ **C.** 43.6

   ○ **D.** 43.59

3. What is 62.465 rounded to the nearest tenth?

   ○ **A.** 62.4

   ○ **B.** 62.5

   ○ **C.** 62.46

   ○ **D.** 62.47

4. Ta'rel is picking apples at a local orchard. The orchard charges for the apples by rounding to the nearest whole pound. What is the largest possible weight of apples that Ta'rel could pick if he wants to pay for no more than 4 pounds of apples?

   ○ **A.** 4.5

   ○ **B.** 3.59

   ○ **C.** 3.9

   ○ **D.** 4.49

5. Which is 201.571 rounded to the nearest hundredth?

   ○ **A.** 200

   ○ **B.** 201.6

   ○ **C.** 201.57

   ○ **D.** 201.58

6. Which of the following would **not** round to 1.2 when rounded to the nearest tenth?

   ○ **A.** 1.149

   ○ **B.** 1.209

   ○ **C.** 1.22

   ○ **D.** 1.18

7 Ethan won a fishing tournament by catching a bass that weighed 10.735 pounds. He wrote an article about it for the school paper. He correctly used a rounded number in the headline. Select a headline he could have used. Mark all that apply.

- ○ **A.** Winning Bass Weighs 10.8 Pounds
- ○ **B.** 11-Pound Bass Caught
- ○ **C.** 10.74-Pound Bass Is Tops
- ○ **D.** Ethan Wins with 11.73-Pound Bass
- ○ **E.** 10.7-Pound Bass Is Biggest Catch of the Day
- ○ **F.** 10.73 Pounds Wins Bass Tournament

8 Mr. Chin wrote the rounded number below on the board.

82.6

Select the boxes in the table to show whether each number cound be the number that Mr. Chin started with.

	82.642	82.59	82.507	82.63	81.6
Yes	○	○	○	○	○
No	○	○	○	○	○

9 Two clues in a number game are shown.

- The number has 3 decimal places.
- The number rounded to the nearest hundredth is 84.72.

The greatest number that matches these clues is _____.

10 Write the rounded number to the given place value for each number in the table.

Exact Number	Rounded Numbers	
	Nearest Tenth	Nearest Hundredth
71.894		
71.955		
72.088		
71.906		

11 Ellie is a runner. She keeps track of winning times for women's long-distance races. The table shows the winning times that Ellie found for the women's 10,000-meter race in four Olympic games.

Olympic Results
Women's 10,000 Meters

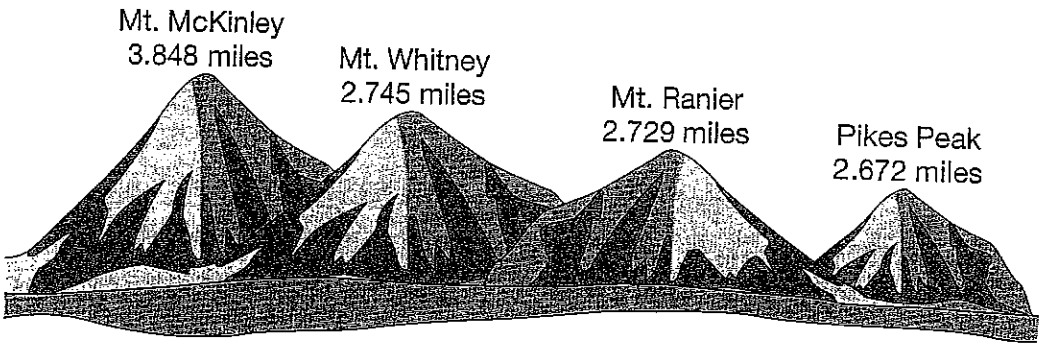
Year	Time (in minutes)
2012	30.346
2008	29.911
2004	30.406
2000	30.292

Suppose Ellie rounds each time to the nearest tenth. In which two years would the winning times appear to be the same? Explain.

12 Bahir's science class grew sunflowers for an experiment. The tallest sunflower grew to 2.387 meters. Bahir made a sketch of the sunflower in his notebook. He will label its height with a rounded decimal that will make the sunflower appear as tall as possible.

Should Bahir use a decimal rounded to the nearest meter, nearest tenth meter, or nearest hundredth meter? Explain your reasoning.

13 This diagram shows the heights of some tall mountains in the United States.



Part A

What happens when you round the heights of each mountain to the nearest mile? Suggest another way to round the heights of the mountains in order to compare them.

Part B

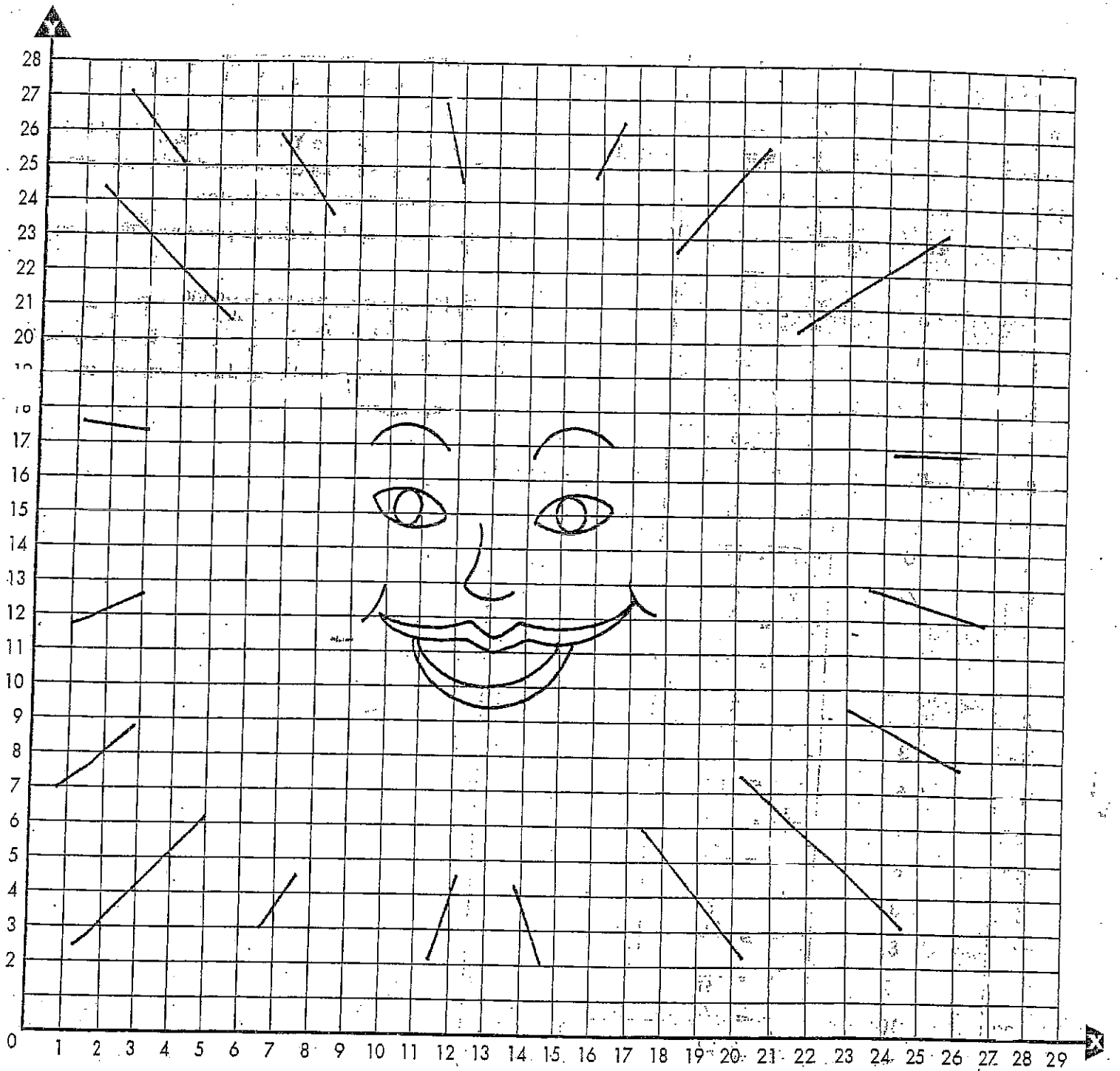
Find two more rounded heights for Mt. Rainier. How do these rounded measures compare to rounded measures of the other three mountains?

Name _____

Solar System

What is the smartest member of the solar system? _____

To find the answer, solve the problems on page 30. Then plot the ordered pairs and connect the points. The picture you make will help you solve the riddle. (The answer is upside down at the bottom of this page.)



Answer: The sun is the brightest.

Name _____

Equivalent Fractions 

Solar System

1. Look at number 1, left. The number in the first column is the X coordinate in an ordered pair.
2. Look at the numbers in the second column. Write the missing number so that the fractions are equivalent. The missing number is the Y coordinate.
3. Write the X and Y coordinates in the third column to make an ordered pair. The first one has been done for you.
4. Determine the ordered pairs for the rest of the chart.
5. Plot the ordered pairs on the graph on page 29 in the order they are given. Then use a straightedge to connect the points in the order you plotted them. Can you solve the riddle?

	X Coordinate	Y Coordinate	Ordered Pair
1.	14	$\frac{4}{9} = \frac{12}{27}$	(14, 27)
2.	15	$\frac{3}{7} = \frac{9}{21}$	
3.	17	$\frac{6}{9} = \frac{36}{54}$	
4.	12	$\frac{2}{3} = \frac{8}{12}$	
5.	22	$\frac{1}{2} = \frac{23}{46}$	
6.	19	$\frac{2}{3} = \frac{38}{57}$	
7.	25	$\frac{1}{3} = \frac{19}{57}$	
8.	28	$\frac{1}{5} = \frac{2}{10}$	
9.	26	$\frac{2}{9} = \frac{14}{63}$	
10.	21	$\frac{13}{10} = \frac{130}{100}$	
11.	25	$\frac{2}{5} = \frac{10}{25}$	
12.	20	$\frac{1}{5} = \frac{11}{55}$	
13.	25	$\frac{2}{11} = \frac{50}{275}$	
14.	19	$\frac{2}{3} = \frac{38}{57}$	
15.	20	$\frac{1}{5} = \frac{4}{20}$	
16.	17	$\frac{1}{7} = \frac{17}{119}$	
17.	17	$\frac{1}{44} = \frac{17}{748}$	
18.	13	$\frac{2}{3} = \frac{26}{39}$	
19.	9	$\frac{1}{7} = \frac{9}{63}$	
20.	10	$\frac{1}{12} = \frac{10}{120}$	
21.	7	$\frac{1}{19} = \frac{7}{133}$	
22.	8	$\frac{1}{4} = \frac{2}{8}$	
23.	3	$\frac{2}{2} = \frac{6}{6}$	
24.	7	$\frac{1}{9} = \frac{7}{63}$	
25.	3	$\frac{2}{5} = \frac{6}{15}$	
26.	6	$\frac{1}{7} = \frac{6}{42}$	
27.	1	$\frac{3}{7} = \frac{3}{21}$	
28.	6	$\frac{3}{8} = \frac{18}{48}$	
29.	3	$\frac{1}{5} = \frac{3}{15}$	
30.	8	$\frac{2}{3} = \frac{16}{24}$	
31.	5	$\frac{1}{7} = \frac{5}{35}$	
32.	10	$\frac{9}{10} = \frac{18}{20}$	
33.	10	$\frac{11}{12} = \frac{110}{120}$	
34.	12	$\frac{2}{3} = \frac{8}{12}$	
35.	14	$\frac{9}{15} = \frac{42}{70}$	

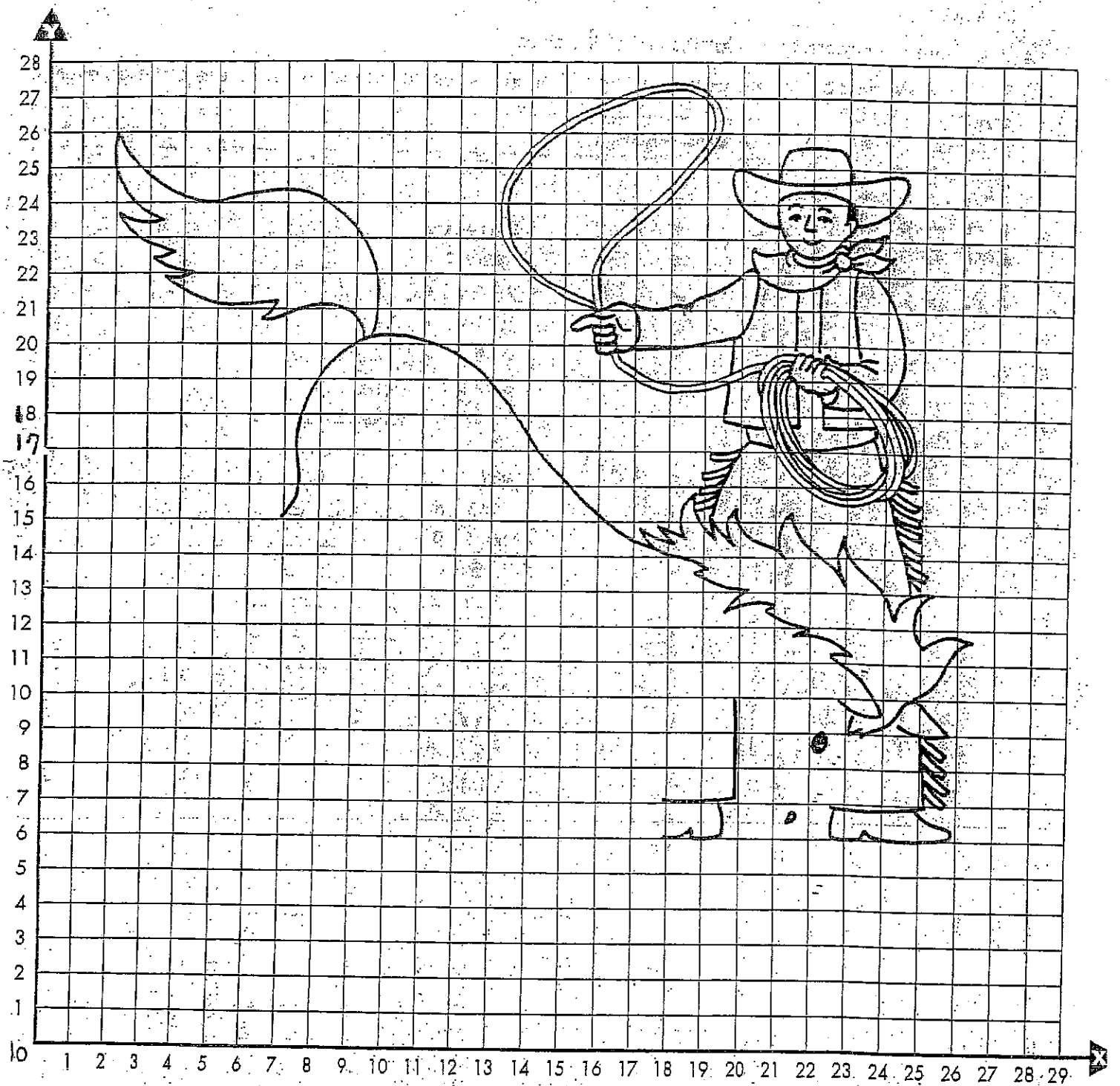
Great Graph Art: Decimals and Fractions, Scholastic Professional Books

Name _____

Rodeo

Why did the cowboy go to the rodeo when he was low on cash? _____

To find the answer, solve the problems on page 20. Then plot the ordered pairs and connect the points. The picture you make will help you solve the riddle. (The answer is upside down at the bottom of this page.)



Answer: to get some bucks

Name _____

Rodeo

1. Look at number 1, below. The number in the first column is the X coordinate in an ordered pair.
2. On a separate sheet of paper, solve the problem in the second column. Round the answer to the nearest whole number, and write it on the blank line. The whole number is the Y coordinate.
3. Write the X and Y coordinates in the third column to make an ordered pair. The first one has been done for you.
4. Determine the ordered pairs for the rest of the chart.
5. Plot the ordered pairs on the graph on page 19 in the order they are given. Then use a straightedge to connect the points in the order you plotted them. After you come to the word "STOP," start a new line. Can you solve the riddle?

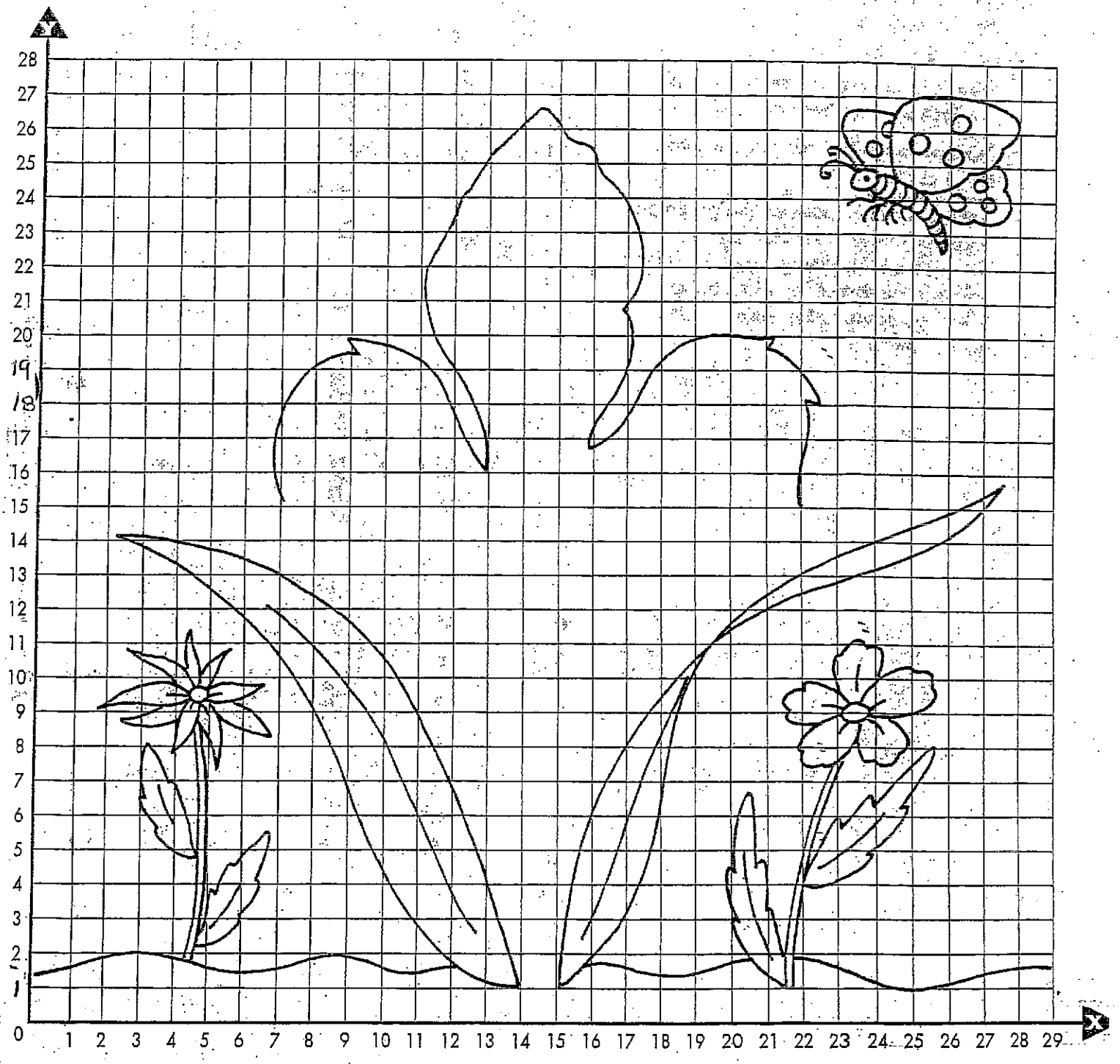
	X Coordinate	Y Coordinate	Ordered Pair
1.	7	3.7 x 4 = 14.8 = 15	(7, 15)
2.	4	1.31 x 8 = _____	
3.	3	2.61 x 4 = _____	
4.	3	1.28 x 7 = _____	
5.	4	3.07 x 3 = _____	
6.	6	1.71 x 7 = _____	
7.	5	2.28 x 4 = _____	
8.	4	2.67 x 3 = _____	
9.	4	1.78 x 4 = _____	
10.	6	1.7 x 5 = _____	
11.	7	1.09 x 11 = _____	
12.	8	2.43 x 5 = _____	
13.	10	1.41 x 10 = _____	
14.	14	3.25 x 3 = _____	
15.	16	2.09 x 2 = _____	
16.	16	0.87 x 2 = _____	
17.	17	0.19 x 4 = _____	
18.	18	0.08 x 7 = _____	
19.	17	1.12 x 2 = _____	
20.	17	0.67 x 9 = _____	
21.	16	1.1 x 7 = _____	STOP
22.	17	0.78 x 8 = _____	
23.	19	1.19 x 2 = _____	
24.	20	0.44 x 5 = _____	
25.	18	2.11 x 3 = _____	
26.	18	3.79 x 2 = _____	
27.	20	1.24 x 8 = _____	
28.	22	1.14 x 9 = _____	
29.	21	1.47 x 6 = _____	
30.	21	2.89 x 2 = _____	
31.	22	3.09 x 2 = _____	
32.	25	1.12 x 9 = _____	

Name _____

Flower Shop

Why did the bicyclist go to the flower shop? _____

To find the answer, solve the problems on page 32. Then plot the ordered pairs and connect the points. The picture you make will help you solve the riddle. (The answer is upside down at the bottom of this page.)



Answer: *He needed new petals (pedals).*

Name _____

Flower Shop

1. Look at number 1, right. The number in the first column is the X coordinate in an ordered pair.
2. Rename the fraction in the second column in its lowest terms. The new numerator is the Y coordinate.
3. Write the X and Y coordinates in the third column to make an ordered pair. The first one has been done for you.
4. Determine the ordered pairs for the rest of the chart.
5. Plot the ordered pairs on the graph on page 31 in the order they are given. Then use a straightedge to connect the points in the order you plotted them. After you come to the word "STOP," start a new line.

	X Coordinate	Y Coordinate	Ordered Pair
1.	15	$\frac{9}{81} = \frac{1}{9}$	(15, 1)
2.	15	$\frac{36}{51} =$	
3.	17	$\frac{52}{68} =$	
4.	19	$\frac{54}{57} =$	
5.	22	$\frac{45}{66} =$	
6.	23	$\frac{32}{82} =$	
7.	23	$\frac{90}{235} =$	
8.	24	$\frac{40}{194} =$	
9.	22	$\frac{69}{90} =$	
10.	21	$\frac{46}{100} =$	
11.	20	$\frac{52}{178} =$	
12.	19	$\frac{78}{87} =$	
13.	17	$\frac{48}{106} =$	STOP
14.	12	$\frac{96}{124} =$	
15.	10	$\frac{52}{142} =$	
16.	9	$\frac{78}{129} =$	
17.	8	$\frac{46}{122} =$	
18.	7	$\frac{92}{364} =$	
19.	5	$\frac{60}{81} =$	
20.	6	$\frac{54}{75} =$	
21.	6	$\frac{48}{69} =$	
22.	7	$\frac{30}{44} =$	
23.	10	$\frac{38}{70} =$	
24.	12	$\frac{52}{68} =$	
25.	14	$\frac{48}{76} =$	
26.	14	$\frac{18}{144} =$	

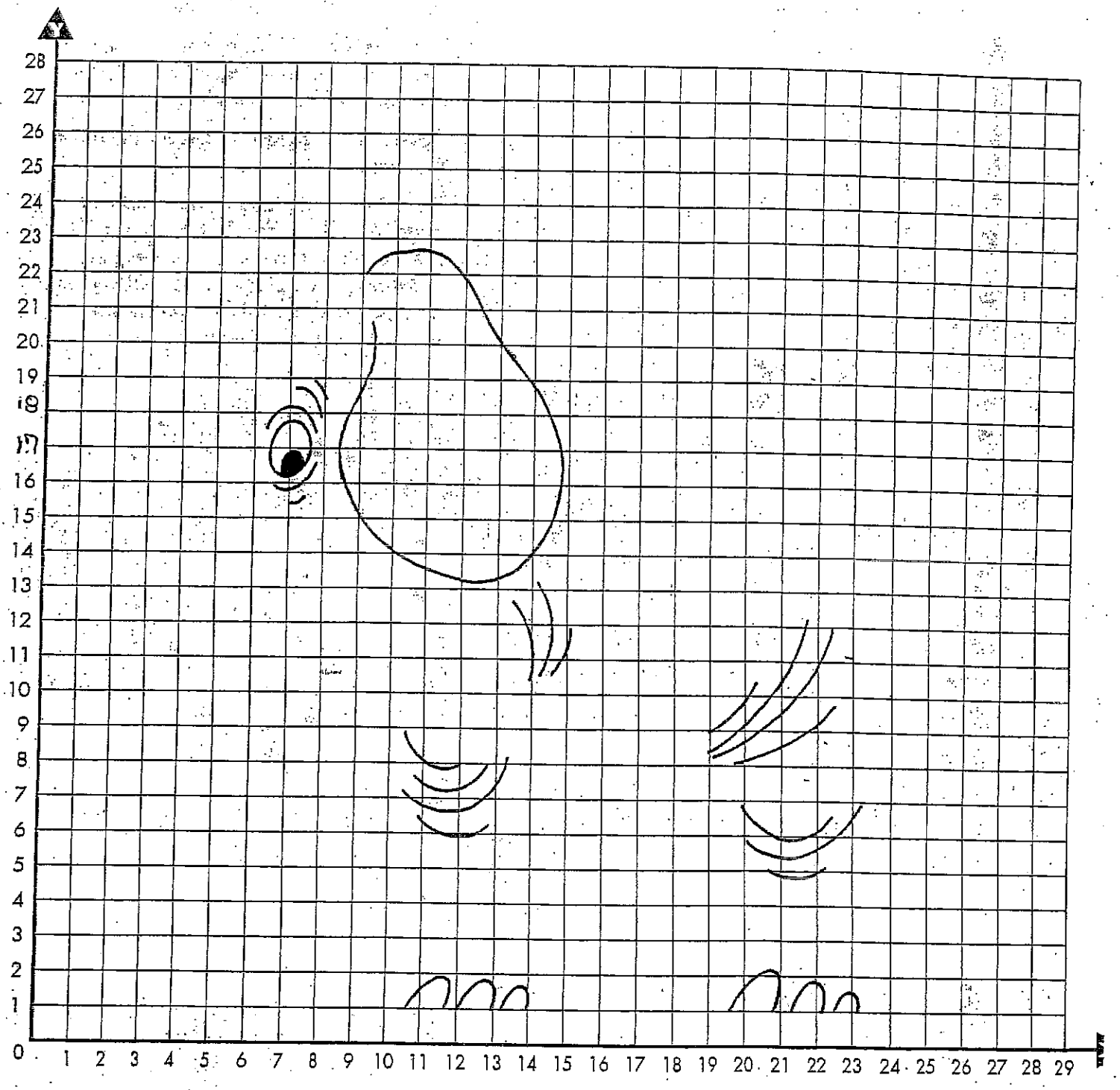
Name _____

Improper Fractions to Mixed Numbers

Vacation

What animal is always ready to go on vacation? _____

To find the answer, solve the problems on page 34. Then plot the ordered pairs and connect the points. The picture you make will help you solve the riddle. (The answer is upside down at the bottom of this page.)



Answer: *An elephant: It always has its trunk with it.*

Name _____

Vacation

1. Look at number 1, left. Write the improper fraction in the first column as a mixed fraction. Do not rename the fraction in lowest terms. The new numerator is the X coordinate. The Y coordinate is given.
2. Write the X and Y coordinates in the third column to make an ordered pair. The first one has been done for you.
3. Determine the ordered pairs for the rest of the chart.
4. Plot the ordered pairs on the graph on page 33 in the order they are given. Then use a straightedge to connect the points in the order you plotted them. After you come to the word "STOP," start a new line. Can you solve the riddle?

	X Coordinate	Y Coordinate	Ordered Pair
1.	$\frac{34}{19} = 1\frac{15}{19}$	1	(15, 1)
2.	$\frac{48}{17} =$	10	
3.	$\frac{75}{25} =$	8	
4.	$\frac{93}{24} =$	3	
5.	$\frac{40}{21} =$	1	
6.	$\frac{74}{25} =$	1	
7.	$\frac{54}{30} =$	8	
8.	$\frac{53}{27} =$	12	
9.	$\frac{85}{26} =$	9	
10.	$\frac{59}{33} =$	18	
11.	$\frac{123}{25} =$	23	
12.	$\frac{62}{43} =$	24	
13.	$\frac{100}{17} =$	24	
14.	$\frac{108}{16} =$	22	STOP
15.	$\frac{99}{10} =$	22	
16.	$\frac{62}{8} =$	22	
17.	$\frac{29}{5} =$	20	
18.	$\frac{21}{6} =$	8	
19.	$\frac{45}{8} =$	2	
20.	$\frac{77}{10} =$	2	
21.	$\frac{18}{11} =$	3	
22.	$\frac{60}{9} =$	3	
23.	$\frac{53}{7} =$	8	
24.	$\frac{35}{6} =$	12	
25.	$\frac{54}{8} =$	10	
26.	$\frac{78}{8} =$	11	
27.	$\frac{34}{13} =$	13	
28.	$\frac{19}{10} =$	13	
29.	$\frac{70}{15} =$	7	
30.	$\frac{40}{14} =$	3	
31.	$\frac{32}{22} =$	1	
32.	$\frac{34}{19} =$	1	

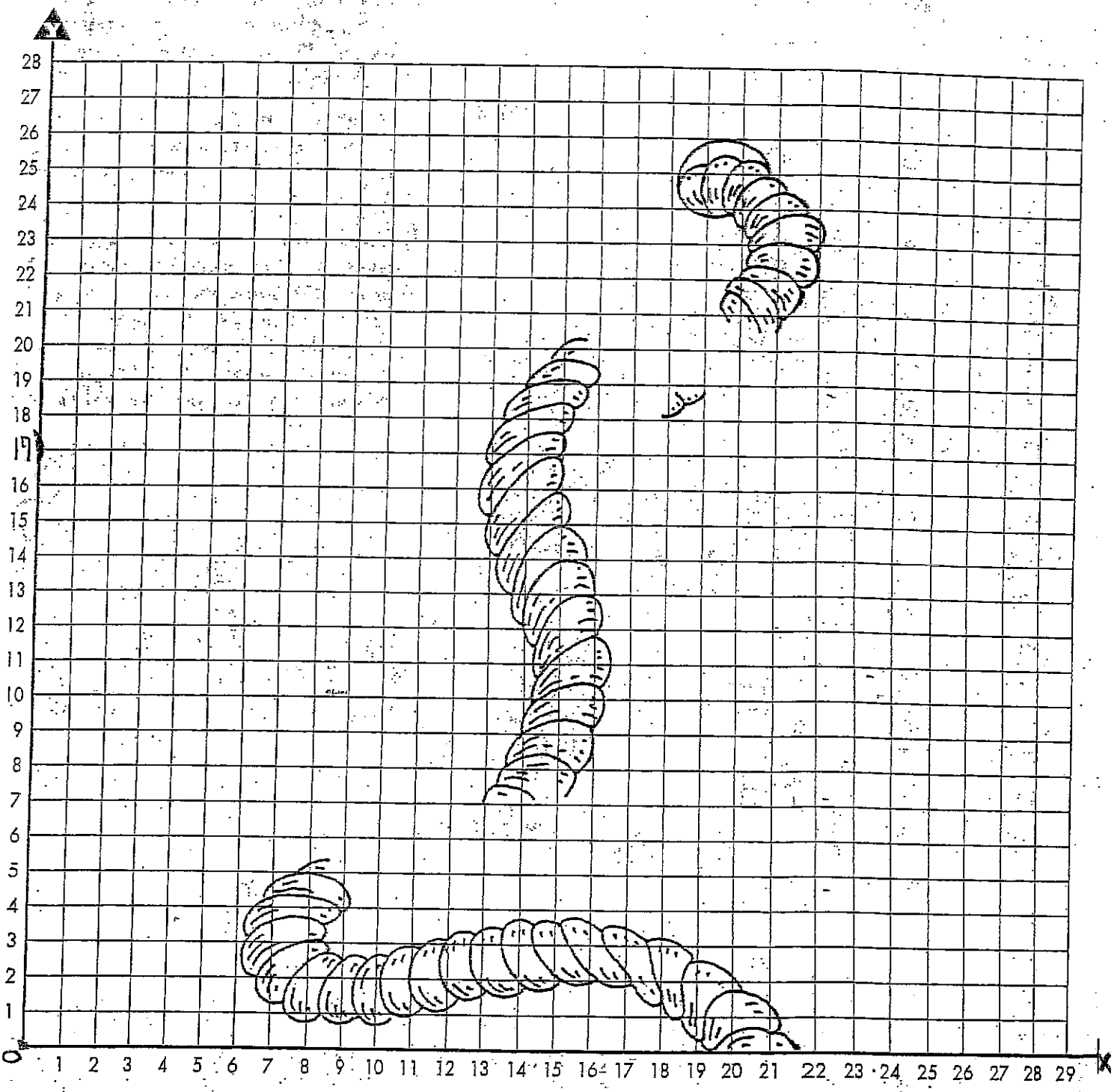
Name _____

Mixed Numbers to Improper Fractions

Ship's Friend

What works best when it's at the end of its rope? _____

To find the answer, solve the problems on page 36. Then plot the ordered pairs and connect the points. The picture you make will help you solve the riddle. (The answer is upside down at the bottom of this page.)



Answer: an anchor

Name _____

Mixed Numbers to Improper Fractions

Ship's Friend

1. Look at number 1, left. The number in the first column is the X coordinate in an ordered pair.
2. Look at the second column. Write the mixed fraction as an improper fraction. The numerator will be the Y coordinate.
3. Write the X and Y coordinates in the third column to make an ordered pair. The first one has been done for you.
4. Plot the ordered pairs on the graph on page 35 in the order they are given. Then use a straightedge to connect the points in the order you plotted them. Each time you come to the word "STOP," start a new line. Can you solve the riddle?

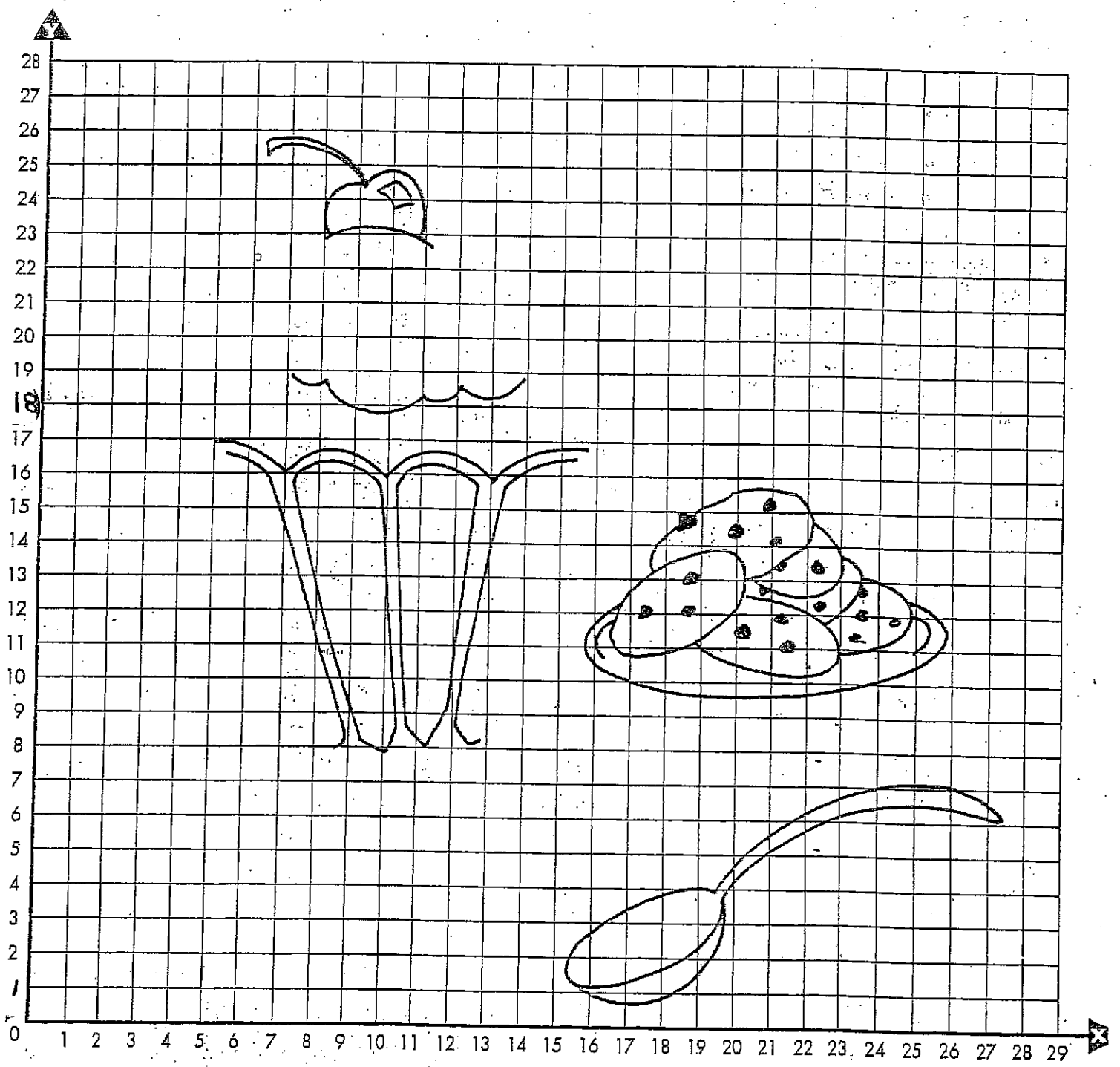
	X Coordinate	Y Coordinate	Ordered Pair
1.	10	$1\frac{1}{2} = \frac{3}{2}$	(10, 3)
2.	22	$2\frac{1}{3} =$	
3.	23	$1\frac{2}{3} =$	
4.	25	$2\frac{1}{4} =$	
5.	20	$4\frac{1}{2} =$	
6.	22	$2\frac{2}{3} =$	
7.	13	$3\frac{1}{2} =$	STOP
8.	16	$4\frac{2}{3} =$	
9.	18	$6\frac{1}{3} =$	
10.	22	$4\frac{3}{4} =$	
11.	23	$3\frac{2}{6} =$	
12.	19	$4\frac{1}{5} =$	
13.	20	$3\frac{2}{7} =$	STOP
14.	22	$4\frac{4}{5} =$	
15.	22	$5\frac{1}{5} =$	
16.	20	$3\frac{6}{7} =$	
17.	19	$3\frac{3}{8} =$	
18.	17	$3\frac{5}{7} =$	
19.	17	$3\frac{3}{7} =$	
20.	18	$7\frac{2}{3} =$	
21.	17	$5\frac{2}{4} =$	
22.	14	$3\frac{2}{7} =$	
23.	13	$3\frac{1}{7} =$	
24.	16	$2\frac{2}{9} =$	
25.	16	$4\frac{3}{4} =$	STOP
26.	13	$2\frac{2}{6} =$	
27.	10	$2\frac{2}{3} =$	
28.	5	$6\frac{1}{2} =$	
29.	7	$2\frac{3}{5} =$	
30.	3	$3\frac{1}{5} =$	
31.	2	$1\frac{3}{9} =$	
32.	4	$3\frac{1}{4} =$	
33.	10	$1\frac{1}{2} =$	

Name _____

Ice Cream Parlor

After weeks of rain, why did the weatherperson go to the ice cream parlor? _____

To find the answer, solve the problems on page 38. Then plot the ordered pairs and connect the points. The picture you make will help you solve the riddle. (The answer is upside down at the bottom of this page.)



Answer: *She wanted a "sun" day (sundae).*

Name _____

Ice Cream Parlor

1. Look at number 1, right. The number in the first column is the X coordinate in an ordered pair.
2. On a separate sheet of paper, solve the problem in the second column. Rename the answer in lowest terms. The numerator in the answer is the Y coordinate.
3. Write the X and Y coordinates in the third column to make an ordered pair. The first one has been done for you.
4. Determine the ordered pairs for the rest of the chart.
5. Plot the ordered pairs on the graph on page 37 in the order they are given. Then use a straightedge to connect the points in the order you plotted them. Each time you come to the word "STOP," start a new line. Can you solve the riddle?

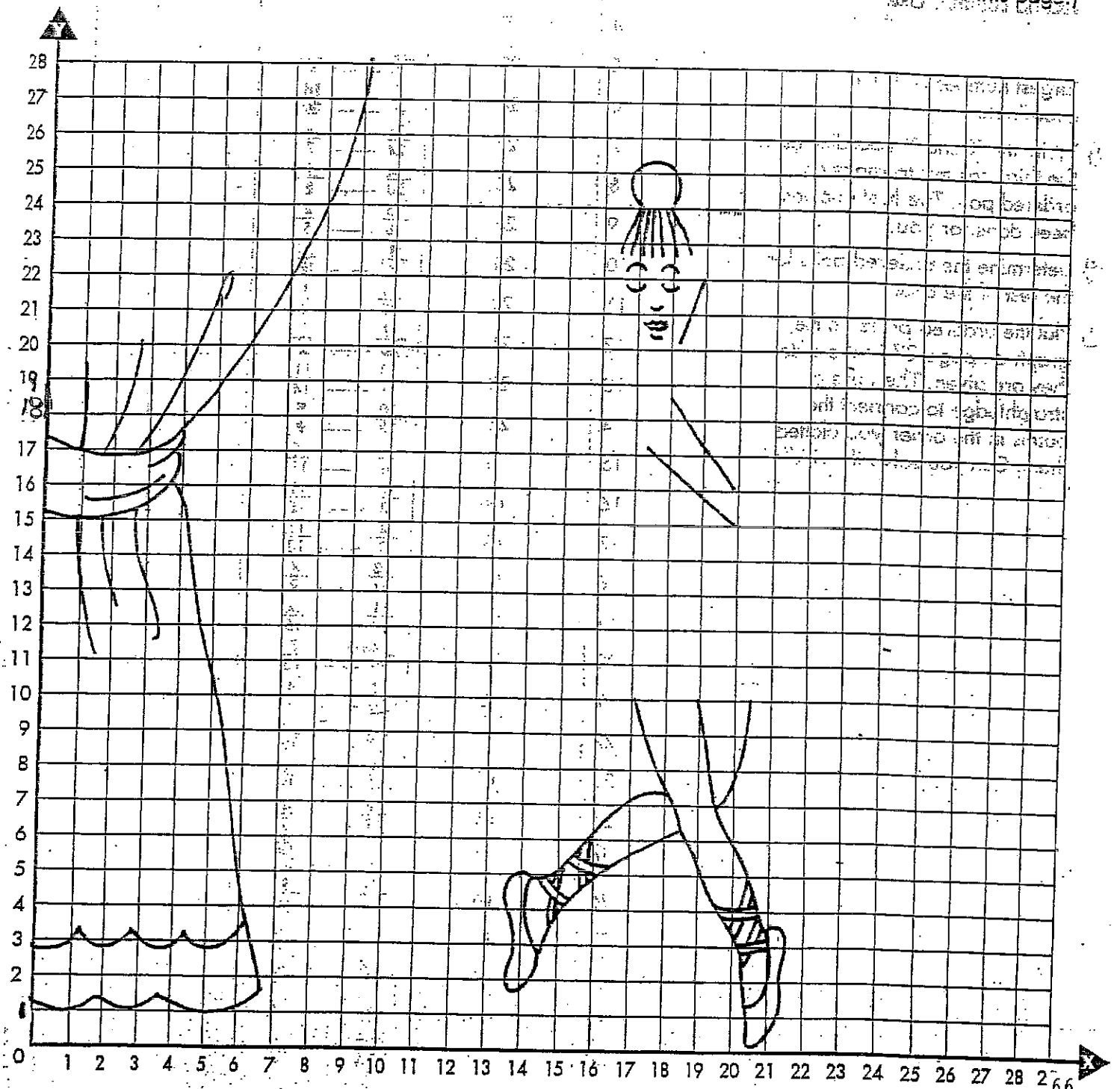
	X Coordinate	Y Coordinate	Ordered Pair
1.	5	$\frac{9}{20} + \frac{8}{20} = \frac{17}{20}$	(5, 17)
2.	8	$\frac{6}{34} + \frac{8}{34} =$	
3.	10	$\frac{6}{9} + \frac{1}{9} =$	
4.	9	$\frac{5}{22} + \frac{7}{22} =$	
5.	5	$\frac{8}{15} + \frac{4}{15} =$	
6.	6	$\frac{4}{38} + \frac{2}{38} =$	
7.	9	$\frac{3}{14} + \frac{1}{14} =$	
8.	12	$\frac{3}{27} + \frac{3}{27} =$	
9.	15	$\frac{2}{7} + \frac{1}{7} =$	
10.	16	$\frac{3}{25} + \frac{17}{25} =$	
11.	12	$\frac{4}{13} + \frac{2}{13} =$	
12.	11	$\frac{15}{60} + \frac{18}{60} =$	
13.	13	$\frac{3}{17} + \frac{5}{17} =$	
14.	16	$\frac{6}{19} + \frac{11}{19} =$	STOP
15.	15	$\frac{5}{40} + \frac{29}{40} =$	
16.	15	$\frac{12}{19} + \frac{6}{19} =$	
17.	14	$\frac{11}{91} + \frac{8}{91} =$	
18.	15	$\frac{13}{29} + \frac{7}{29} =$	
19.	14	$\frac{14}{47} + \frac{7}{47} =$	
20.	14	$\frac{19}{46} + \frac{25}{46} =$	
21.	13	$\frac{11}{30} + \frac{12}{30} =$	
22.	11	$\frac{28}{120} + \frac{41}{120} =$	STOP
23.	8	$\frac{9}{25} + \frac{14}{25} =$	
24.	7	$\frac{19}{27} + \frac{3}{27} =$	
25.	7	$\frac{18}{58} + \frac{24}{58} =$	
26.	6	$\frac{5}{43} + \frac{15}{43} =$	
27.	7	$\frac{18}{20} + \frac{1}{20} =$	
28.	6	$\frac{23}{69} + \frac{31}{69} =$	
29.	6	$\frac{5}{20} + \frac{12}{20} =$	

Name _____

Practice Makes Perfect

You know what they say: "Practice makes perfect." I have to practice my skills every day to stay on my toes. What am I? _____

To find the answer, solve the problems on page 28. Then plot the ordered pairs and connect the points. The picture you make will help you solve the riddle. (The answer is upside down at the bottom of this page.)



Answer: a ballerina

Name _____

Practice Makes Perfect

1. Look at number 1, right. The number in the first column is the X coordinate in an ordered pair.
2. Look at the fractions in the second column. Use < or > to compare the two fractions. The numerator of the largest number is the Y coordinate.
3. Write the X and Y coordinates in the third column to make an ordered pair. The first one has been done for you.
4. Determine the ordered pairs for the rest of the chart.
5. Plot the ordered pairs on the graph on page 27 in the order they are given. Then use a straightedge to connect the points in the order you plotted them. Can you solve the riddle?

	X Coordinate	Y Coordinate	Ordered Pair
1.	21	$\frac{13}{15} < \frac{28}{30}$	(21, 28)
2.	20	$\frac{26}{27} \_\_ \frac{9}{10}$	
3.	20	$\frac{12}{17} \_\_ \frac{22}{30}$	
4.	19	$\frac{9}{10} \_\_ \frac{19}{20}$	
5.	20	$\frac{18}{20} \_\_ \frac{7}{8}$	
6.	20	$\frac{6}{10} \_\_ \frac{13}{20}$	
7.	24	$\frac{16}{24} \_\_ \frac{4}{7}$	
8.	25	$\frac{14}{20} \_\_ \frac{1}{2}$	
9.	24	$\frac{15}{18} \_\_ \frac{4}{5}$	
10.	20	$\frac{3}{4} \_\_ \frac{13}{16}$	
11.	24	$\frac{13}{25} \_\_ \frac{1}{2}$	
12.	25	$\frac{11}{20} \_\_ \frac{1}{2}$	
13.	23	$\frac{13}{17} \_\_ \frac{11}{14}$	
14.	23	$\frac{10}{13} \_\_ \frac{5}{9}$	
15.	15	$\frac{5}{6} \_\_ \frac{10}{11}$	
16.	14	$\frac{1}{3} \_\_ \frac{11}{15}$	
17.	13	$\frac{4}{9} \_\_ \frac{11}{13}$	
18.	11	$\frac{13}{24} \_\_ \frac{4}{9}$	
19.	11	$\frac{11}{13} \_\_ \frac{14}{15}$	
20.	12	$\frac{14}{29} \_\_ \frac{7}{15}$	
21.	12	$\frac{15}{30} \_\_ \frac{4}{9}$	
22.	17	$\frac{3}{17} \_\_ \frac{16}{19}$	
23.	17	$\frac{4}{13} \_\_ \frac{16}{29}$	
24.	16	$\frac{18}{19} \_\_ \frac{4}{5}$	
25.	17	$\frac{3}{7} \_\_ \frac{20}{31}$	
26.	16	$\frac{22}{29} \_\_ \frac{9}{13}$	
27.	17	$\frac{24}{31} \_\_ \frac{2}{3}$	
28.	18	$\frac{24}{38} \_\_ \frac{6}{13}$	
29.	19	$\frac{6}{11} \_\_ \frac{22}{30}$	
30.	19	$\frac{27}{30} \_\_ \frac{3}{5}$	
31.	21	$\frac{1}{7} \_\_ \frac{28}{60}$	

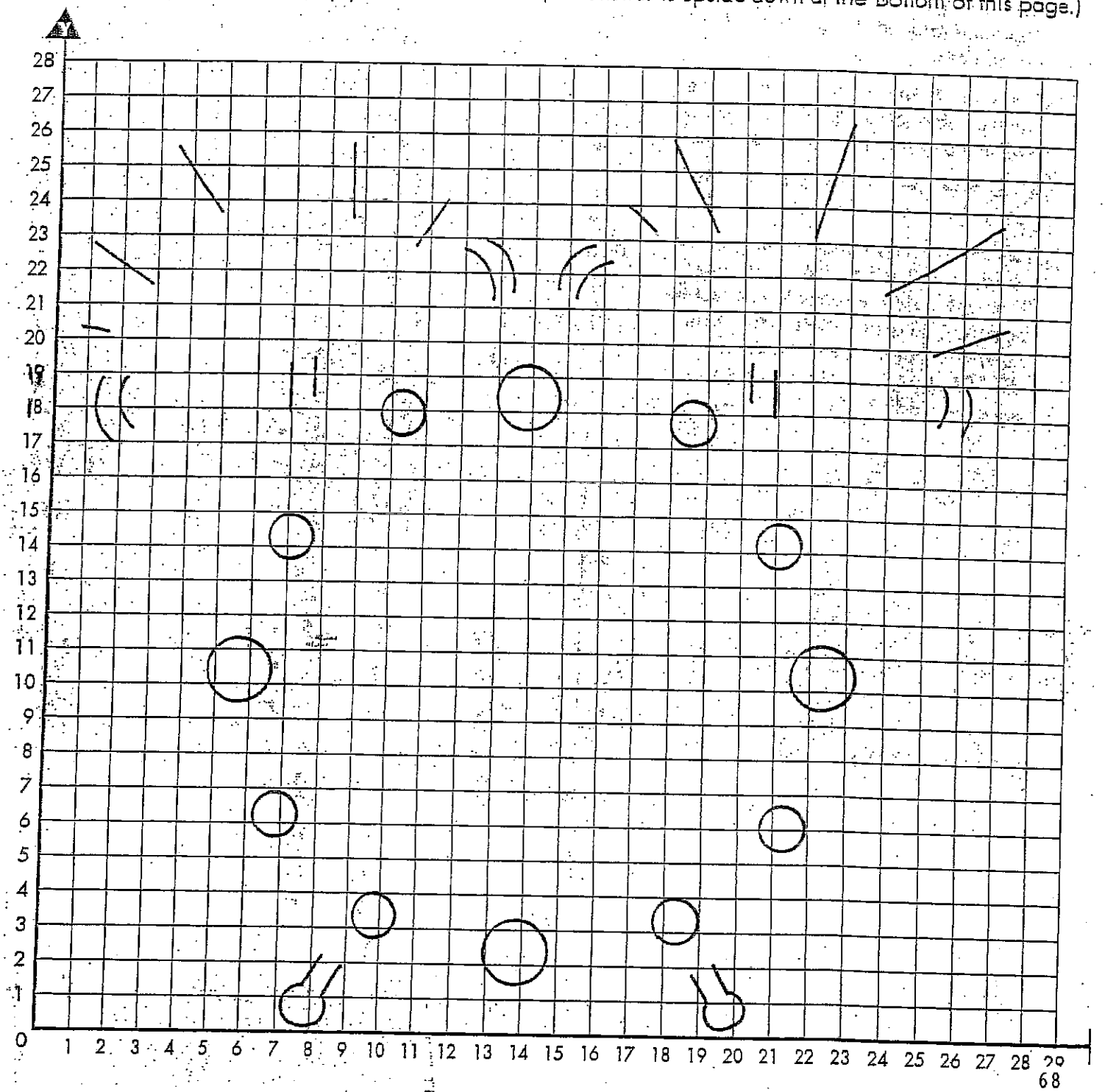
Name _____

Subtraction of Fractions With Like Denominators

What Am I?

What has hands but no feet,
A face but no nose,
No mouth, but demands an answer? _____

To find the answer, solve the problems on page 40. Then plot the ordered pairs and connect the points. The picture you make will help you solve the riddle. (The answer is upside down at the bottom of this page.)



Answer: an alarm clock

Name _____

What Am I?

1. Look at number 1, right. The number in the first column is the X coordinate in an ordered pair.
2. On a separate sheet of paper, solve the problem in the second column. Rename the answer in lowest terms. The numerator in the answer is the Y coordinate.
3. Write the X and Y coordinates in the third column to make an ordered pair. The first one has been done for you.
4. Determine the ordered pairs for the rest of the chart.
5. Plot the ordered pairs on the graph on page 39 in the order they are given. Then use a straightedge to connect the points in the order you plotted them. Each time you come to the word "STOP," start a new line. Can you solve the riddle?

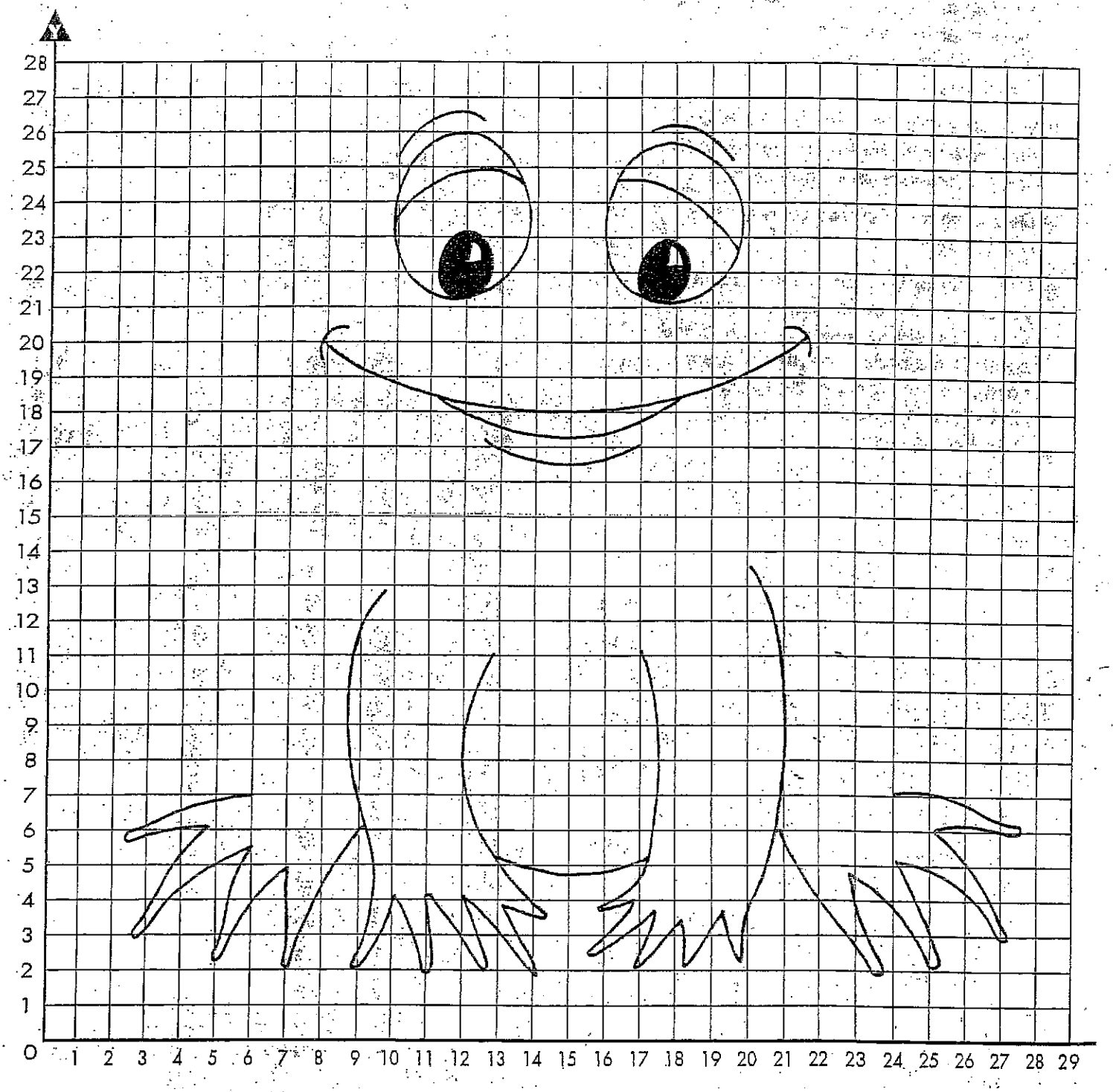
	X Coordinate	Y Coordinate	Ordered Pair
1.	11	$\frac{29}{21} - \frac{9}{21} = \frac{20}{21}$	(11, 20)
2.	17	$\frac{35}{83} - \frac{15}{83} =$	
3.	21	$\frac{22}{23} - \frac{4}{23} =$	
4.	24	$\frac{29}{30} - \frac{3}{30} =$	
5.	24	$\frac{12}{17} - \frac{4}{17} =$	
6.	21	$\frac{8}{38} - \frac{2}{38} =$	
7.	17	$\frac{9}{21} - \frac{6}{21} =$	
8.	11	$\frac{13}{20} - \frac{8}{20} =$	
9.	7	$\frac{10}{11} - \frac{7}{11} =$	
10.	4	$\frac{35}{36} - \frac{3}{36} =$	
11.	4	$\frac{16}{17} - \frac{3}{17} =$	
12.	7	$\frac{23}{25} - \frac{5}{25} =$	
13.	11	$\frac{45}{62} - \frac{5}{62} =$	STOP
14.	14	$\frac{30}{35} - \frac{2}{35} =$	
15.	14	$\frac{27}{34} - \frac{5}{34} =$	
16.	19	$\frac{19}{17} - \frac{3}{17} =$	STOP
17.	17	$\frac{27}{29} - \frac{5}{29} =$	
18.	22	$\frac{31}{37} - \frac{9}{37} =$	
19.	25	$\frac{39}{40} - \frac{1}{40} =$	
20.	25	$\frac{22}{25} - \frac{4}{25} =$	
21.	16	$\frac{44}{40} - \frac{23}{40} =$	
22.	17	$\frac{41}{53} - \frac{19}{53} =$	STOP
23.	11	$\frac{78}{93} - \frac{12}{93} =$	
24.	12	$\frac{25}{26} - \frac{4}{26} =$	
25.	3	$\frac{22}{23} - \frac{4}{23} =$	
26.	3	$\frac{62}{58} - \frac{24}{58} =$	
27.	6	$\frac{41}{43} - \frac{19}{43} =$	
28.	11	$\frac{28}{29} - \frac{6}{29} =$	

Name _____

Lost Job

Why did the amphibian lose his job? _____

To find the answer, solve the problems on page 42. Then plot the ordered pairs and connect the points. The picture you make will help you solve the riddle. (The answer is upside down at the bottom of this page.)



Answer: He was the low man on the totem (toad-em) pole.

Name _____

Lost Job

1. Look at number 1, right. The number in the first column is the X coordinate in an ordered pair.
2. On a separate sheet of paper, solve the problem in the second column. Rename the answer in lowest terms. The numerator in the answer is the Y coordinate.
3. Write the X and Y coordinates in the third column to make an ordered pair. The first one has been done for you.
4. Determine the ordered pairs for the rest of the chart.
5. Plot the ordered pairs on the graph on page 41 in the order they are given. Then use a straightedge to connect the points in the order you plotted them. Each time you come to the word "STOP," start a new line. Can you solve the riddle?

	X Coordinate	Y Coordinate	Ordered Pair
1.	6	$\frac{2}{10} + \frac{3}{20} = \frac{7}{20}$	(6, 7)
2.	3	$\frac{3}{30} + \frac{5}{5} =$	
3.	4	$\frac{4}{5} + \frac{2}{40} =$	
4.	5	$\frac{6}{22} + \frac{1}{2} =$	
5.	9	$\frac{7}{38} + \frac{17}{38} =$	STOP
6.	9	$\frac{1}{7} + \frac{4}{35} =$	
7.	6	$\frac{1}{2} + \frac{3}{7} =$	STOP
8.	24	$\frac{1}{5} + \frac{4}{15} =$	
9.	27	$\frac{9}{25} + \frac{1}{5} =$	
10.	25	$\frac{1}{4} + \frac{3}{5} =$	
11.	25	$\frac{4}{9} + \frac{9}{18} =$	
12.	21	$\frac{10}{26} + \frac{7}{13} =$	STOP
13.	24	$\frac{1}{3} + \frac{2}{7} =$	
14.	21	$\frac{1}{25} + \frac{1}{5} =$	STOP
15.	24	$\frac{1}{3} + \frac{7}{27} =$	
16.	22	$\frac{2}{5} + \frac{9}{20} =$	
17.	23	$\frac{2}{27} + \frac{2}{3} =$	
18.	21	$\frac{2}{5} + \frac{12}{25} =$	
19.	22	$\frac{28}{58} + \frac{10}{29} =$	
20.	19	$\frac{15}{40} + \frac{6}{20} =$	
21.	17	$\frac{5}{29} + \frac{44}{58} =$	
22.	15	$\frac{3}{8} + \frac{13}{32} =$	
23.	13	$\frac{2}{5} + \frac{11}{40} =$	
24.	11	$\frac{7}{37} + \frac{20}{37} =$	
25.	8	$\frac{11}{29} + \frac{13}{29} =$	
26.	9	$\frac{3}{5} + \frac{7}{25} =$	
27.	7	$\frac{17}{23} + \frac{9}{69} =$	
28.	8	$\frac{2}{25} + \frac{3}{5} =$	
29.	6	$\frac{2}{7} + \frac{6}{35} =$	

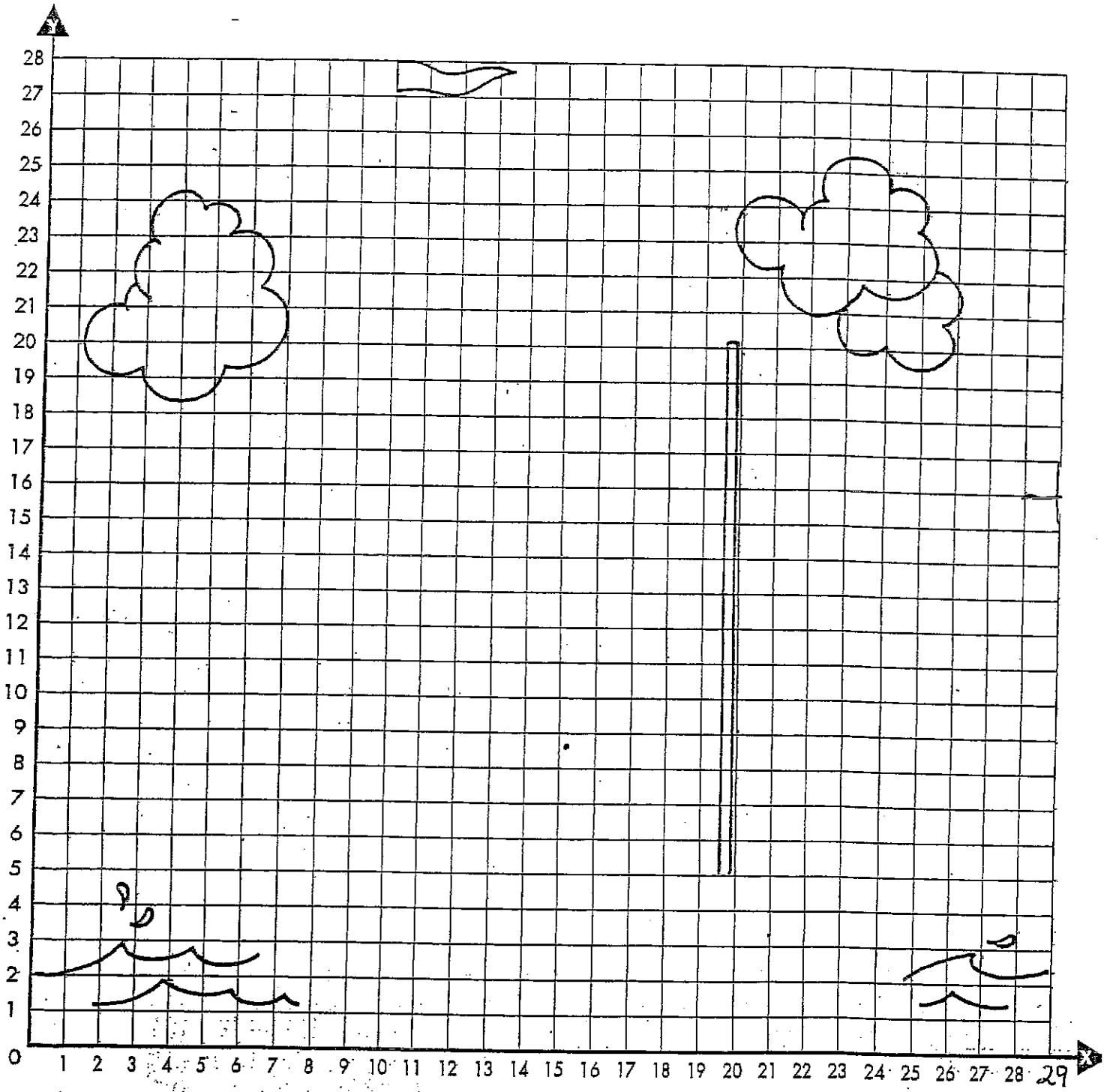
Name _____

Subtraction of Fractions With Unlike Denominators

Boating

What kind of boat do you buy when you're short on cash? _____

To find the answer, solve the problems on page 44. Then plot the ordered pairs and connect the points. The picture you make will help you solve the riddle. (The answer is upside down at the bottom of this page.)



Answer: a "sale" boat (sailboat)

Name _____

Boating

1. Look at number 1, below. The number in the first column is the X coordinate in an ordered pair.
2. On a separate sheet of paper, solve the problem in the second column. Rename the answer in lowest terms. The numerator in the answer is the Y coordinate.
3. Write the X and Y coordinates in the third column to make an ordered pair. The first one has been done for you.
4. Determine the ordered pairs for the rest of the chart.
5. Plot the ordered pairs on the graph on page 43 in the order they are given. Then use a straightedge to connect the points in the order you plotted them. Each time you come to the word "STOP," start a new line. Can you solve the riddle?

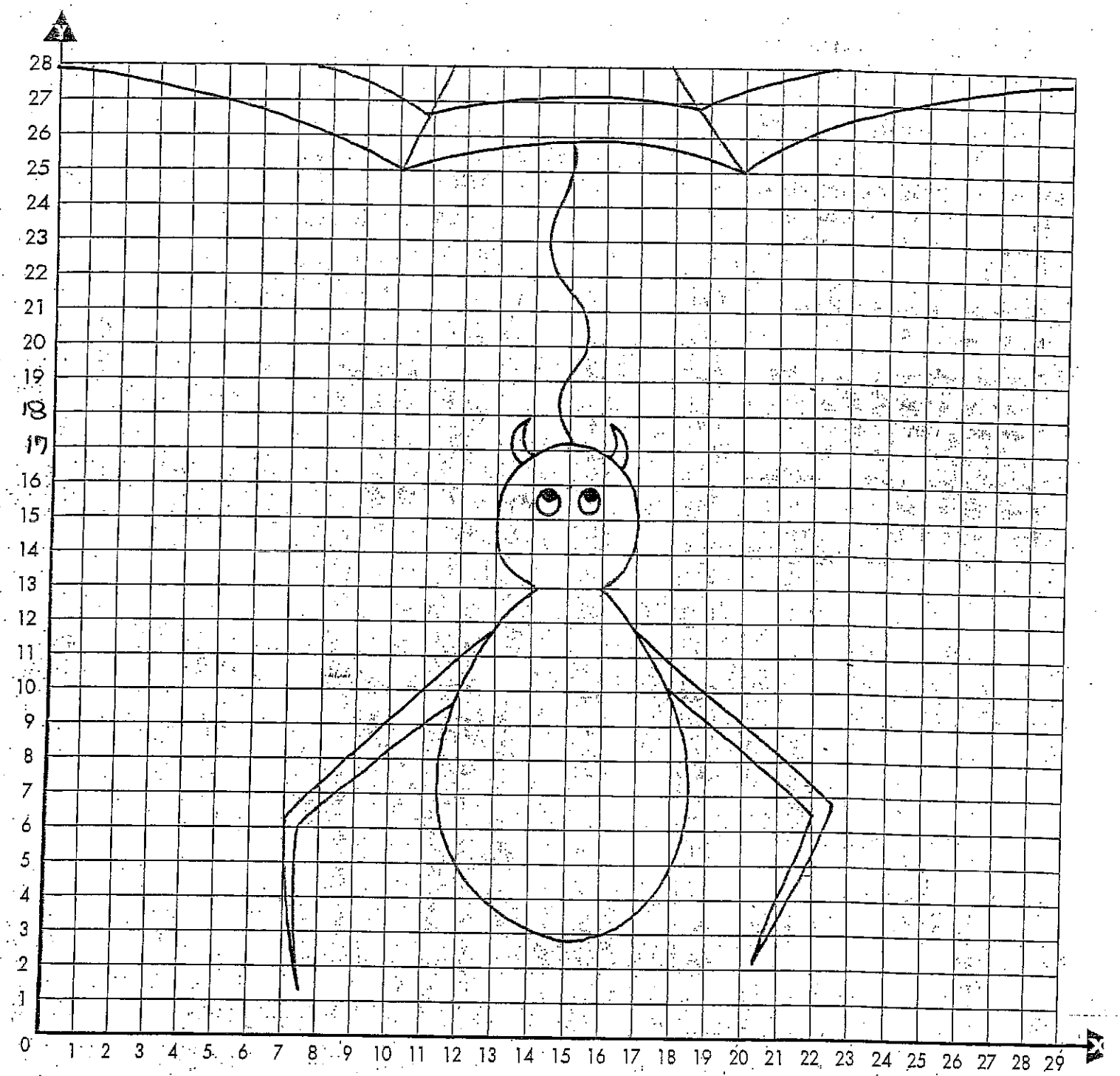
	X Coordinate	Y Coordinate	Ordered Pair
1.	4	$\frac{11}{12} - \frac{2}{4} = \frac{5}{12}$	(4, 5)
2.	27	$\frac{15}{19} - \frac{20}{38} =$	
3.	24	$\frac{22}{33} - \frac{1}{3} =$	
4.	8	$\frac{24}{27} - \frac{7}{9} =$	
5.	4	$\frac{6}{7} - \frac{13}{21} =$	STOP
6.	4	$\frac{10}{11} - \frac{8}{22} =$	
7.	9	$\frac{50}{50} - \frac{3}{25} =$	
8.	9	$\frac{27}{35} - \frac{3}{5} =$	
9.	4	$\frac{12}{19} - \frac{12}{38} =$	STOP
10.	10	$\frac{7}{9} - \frac{9}{18} =$	
11.	10	$\frac{7}{8} - \frac{1}{32} =$	
12.	15	$\frac{6}{7} - \frac{1}{28} =$	
13.	10	$\frac{34}{34} - \frac{1}{17} =$	STOP
14.	10	$\frac{2}{5} - \frac{16}{55} =$	
15.	19	$\frac{1}{5} - \frac{7}{65} =$	
16.	16	$\frac{26}{27} - \frac{1}{9} =$	
17.	10	$\frac{27}{32} - \frac{3}{8} =$	STOP
18.	20	$\frac{38}{35} - \frac{6}{70} =$	
19.	26	$\frac{14}{26} - \frac{6}{78} =$	
20.	21	$\frac{13}{20} - \frac{3}{40} =$	
21.	20	$\frac{25}{28} - \frac{3}{14} =$	

Name _____

World Wide Web

What creature works on the World Wide Web? _____

To find the answer, solve the problems on page 46. Then plot the ordered pairs and connect the points. The picture you make will help you solve the riddle. (The answer is upside down at the bottom of this page.)



Answer: a spider

Name _____

World Wide Web

1. Look at number 1, right. The number in the first column is the X coordinate in an ordered pair.
2. On a separate sheet of paper, solve the problem in the second column. Rename the answer in lowest terms. The numerator in the answer is the Y coordinate.
3. Write the X and Y coordinates in the third column to make an ordered pair. The first one has been done for you.
4. Determine the ordered pairs for the rest of the chart.
5. Plot the ordered pairs on the graph on page 45 in the order they are given. Then use a straightedge to connect the points in the order you plotted them. Each time you come to the word "STOP," start a new line. Can you solve the riddle?

	X Coordinate	Y Coordinate	Ordered Pair
1.	17	$3\frac{5}{17} + 4\frac{11}{17} = 7\frac{16}{17}$	(17, 16)
2.	21	$7\frac{9}{23} + 6\frac{11}{23} =$	
3.	20	$1\frac{23}{29} + 3\frac{2}{29} =$	
4.	22	$2\frac{13}{27} + 5\frac{7}{27} =$	
5.	17	$6\frac{9}{19} + 3\frac{6}{19} =$	STOP
6.	17	$2\frac{8}{27} + 5\frac{6}{27} =$	
7.	24	$5\frac{7}{31} + 1\frac{8}{31} =$	
8.	28	$1\frac{13}{20} + 1\frac{6}{20} =$	
9.	24	$5\frac{7}{15} + 1\frac{7}{15} =$	
10.	16	$3\frac{19}{30} + 4\frac{7}{30} =$	
11.	22	$4\frac{15}{34} + 4\frac{7}{34} =$	
12.	25	$2\frac{13}{35} + 3\frac{17}{35} =$	
13.	22	$6\frac{4}{11} + 6\frac{6}{11} =$	
14.	17	$2\frac{5}{37} + 1\frac{7}{37} =$	STOP
15.	13	$1\frac{2}{21} + 2\frac{14}{21} =$	
16.	9	$7\frac{13}{31} + 9\frac{7}{31} =$	
17.	10	$13\frac{18}{51} + 5\frac{7}{51} =$	
18.	8	$3\frac{19}{29} + 4\frac{1}{29} =$	
19.	13	$4\frac{15}{34} + 5\frac{15}{34} =$	STOP
20.	13	$7\frac{7}{27} + 22\frac{7}{27} =$	
21.	6	$2\frac{6}{53} + 6\frac{9}{53} =$	
22.	2	$6\frac{15}{40} + 5\frac{23}{40} =$	
23.	6	$15\frac{6}{18} + 6\frac{8}{18} =$	
24.	14	$1\frac{16}{51} + 4\frac{23}{51} =$	
25.	7	$7\frac{13}{32} + 5\frac{9}{32} =$	
26.	4	$6\frac{5}{46} + 1\frac{7}{46} =$	
27.	7	$8\frac{1}{57} + 8\frac{9}{57} =$	
28.	13	$6\frac{5}{35} + 13\frac{7}{35} =$	

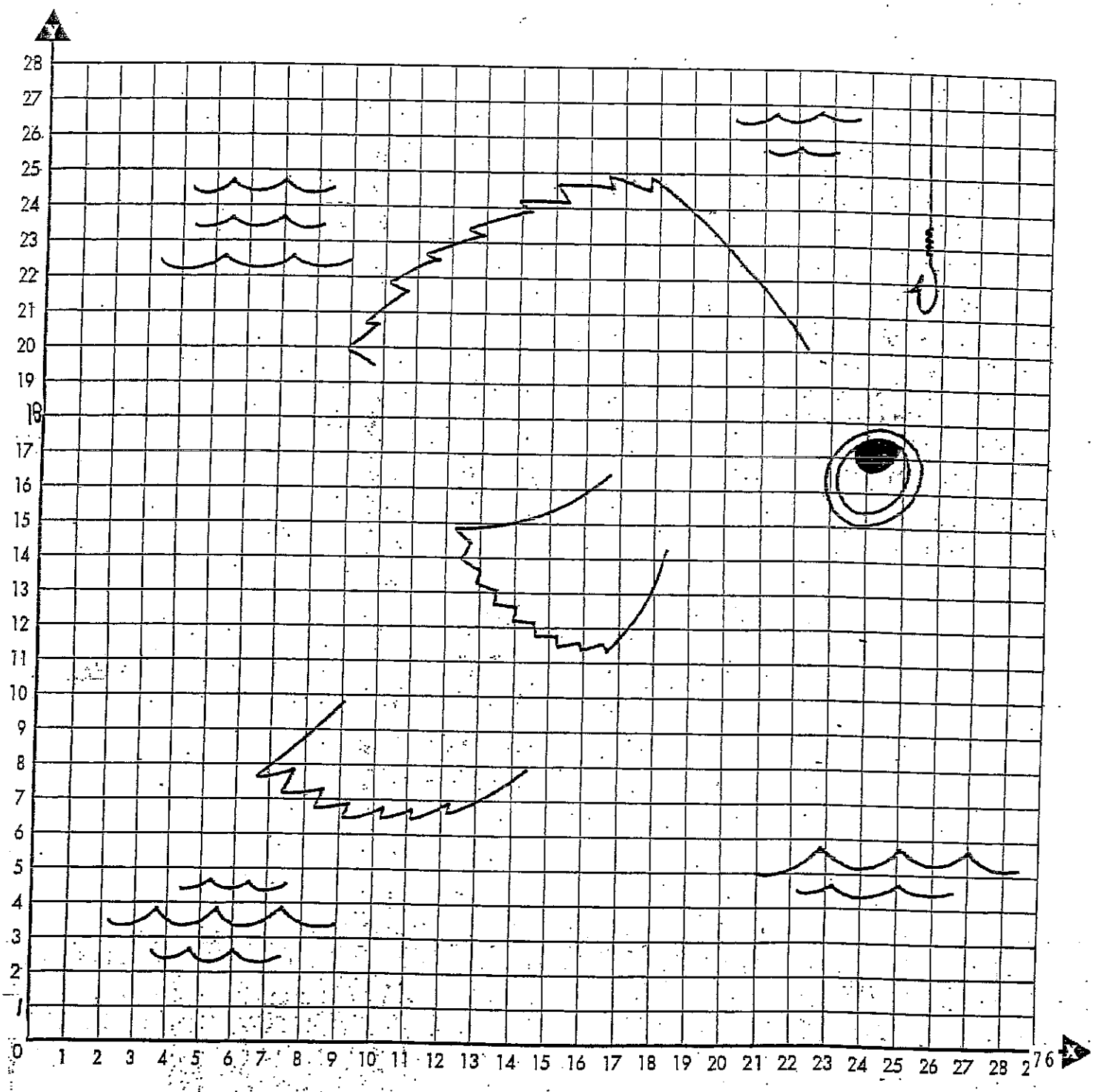
Name _____

Subtraction of Mixed Fractions With Like Denominators

Bad Habits

Why don't fish smoke cigarettes? _____

To find the answer, solve the problems on page 48. Then plot the ordered pairs and connect the points. The picture you make will help you solve the riddle. (The answer is upside down at the bottom of this page.)



Name _____

Bad Habits

1. Look at number 1, right. The number in the first column is the X coordinate in an ordered pair.
2. On a separate sheet of paper, solve the problem in the second column. Rename the answer in lowest terms. The numerator in the answer is the Y coordinate.
3. Write the X and Y coordinates in the third column to make an ordered pair. The first one has been done for you.
4. Determine the ordered pairs for the rest of the chart.
5. Plot the ordered pairs on the graph on page 47 in the order they are given. Then use a straightedge to connect the points in the order you plotted them. When you come to the word "STOP," start a new line. Can you solve the riddle?

	X Coordinate	Y Coordinate	Ordered Pair
1.	28	$12\frac{25}{57} - 5\frac{9}{57} = 7\frac{16}{57}$	(28, 16)
2.	25	$17\frac{22}{23} - 6\frac{3}{23} =$	
3.	17	$9\frac{29}{31} - 3\frac{7}{31} =$	
4.	15	$12\frac{24}{25} - 5\frac{2}{25} =$	
5.	10	$15\frac{35}{51} - 6\frac{15}{51} =$	
6.	8	$9\frac{33}{34} - 5\frac{1}{34} =$	
7.	5	$5\frac{38}{47} - 2\frac{22}{47} =$	
8.	3	$11\frac{33}{39} - 3\frac{13}{39} =$	
9.	1	$7\frac{27}{29} - 1\frac{9}{29} =$	
10.	2	$24\frac{37}{38} - 7\frac{7}{38} =$	
11.	2	$13\frac{19}{33} - 5\frac{5}{33} =$	
12.	1	$5\frac{38}{52} - 3\frac{16}{52} =$	
13.	3	$16\frac{18}{32} - 7\frac{9}{32} =$	
14.	5	$12\frac{45}{37} - 9\frac{32}{37} =$	
15.	8	$9\frac{34}{45} - 2\frac{21}{45} =$	
16.	8	$14\frac{30}{34} - 9\frac{8}{34} =$	
17.	11	$33\frac{37}{39} - 14\frac{13}{39} =$	
18.	15	$13\frac{19}{31} - 2\frac{11}{31} =$	
19.	15	$14\frac{35}{84} - 5\frac{19}{84} =$	
20.	19	$17\frac{10}{11} - 3\frac{2}{11} =$	STOP
21.	17	$12\frac{19}{23} - 4\frac{13}{23} =$	
22.	17	$16\frac{15}{42} - 6\frac{7}{42} =$	
23.	20	$15\frac{16}{19} - 13\frac{8}{19} =$	
24.	24	$9\frac{16}{51} - 4\frac{7}{51} =$	
25.	28	$15\frac{45}{58} - 9\frac{21}{58} =$	
26.	26	$6\frac{27}{31} - 4\frac{14}{31} =$	
27.	27	$35\frac{16}{17} - 22\frac{2}{17} =$	
28.	28	$20\frac{26}{71} - 13\frac{10}{71} =$	

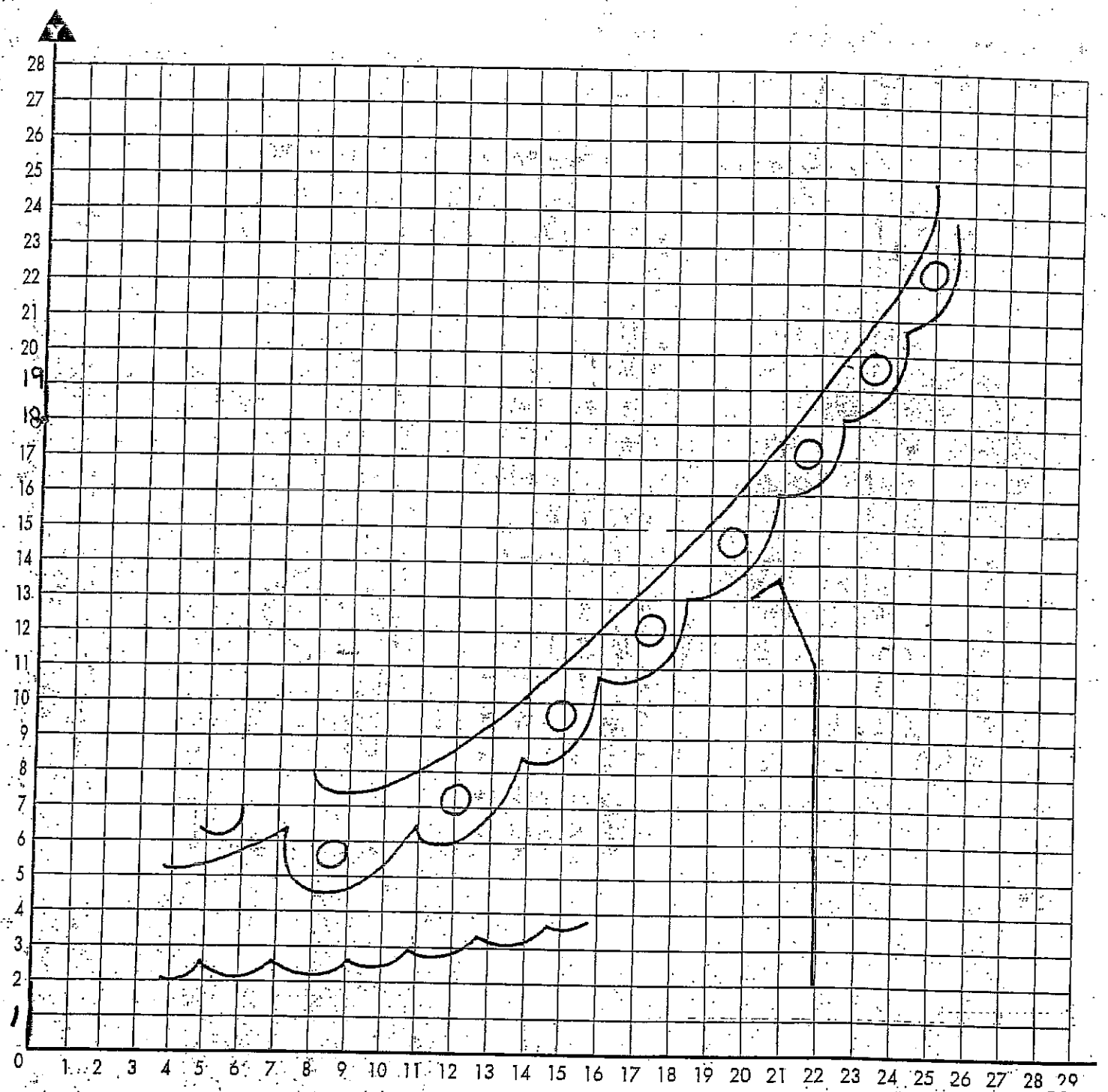
Name _____

Addition of Mixed Fractions With Unlike Denominators

Shoemaker

Why did the shoemaker quit her job? _____

To find the answer, solve the problems on page 50. Then plot the ordered pairs and connect the points. The picture you make will help you solve the riddle. (Thse answer is upside down at the bottom of this page.)



Answer: She was tired of working with heels.

Name _____

Shoemaker

1. Look at number 1, below. The number in the first column is the X coordinate in an ordered pair.
2. On a separate sheet of paper, solve the problem in the second column. Rename the answer in lowest terms. The numerator in the answer is the Y coordinate.
3. Write the X and Y coordinates in the third column to make an ordered pair. The first one has been done for you.
4. Determine the ordered pairs for the rest of the chart.
5. Plot the ordered pairs on the graph on page 49 in the order they are given. Then use a straightedge to connect the points in the order you plotted them. Can you solve the riddle?

	X Coordinate	Y Coordinate	Ordered Pair
1.	24	$3\frac{16}{27} + 2\frac{1}{3} = 5\frac{25}{27}$	(24, 25)
2.	25	$7\frac{5}{32} + 4\frac{5}{8} =$	
3.	27	$6\frac{3}{5} + 3\frac{6}{25} =$	
4.	27	$2\frac{3}{15} + 2\frac{11}{30} =$	
5.	24	$6\frac{10}{36} + 2\frac{6}{18} =$	
6.	24	$1\frac{1}{5} + 1\frac{2}{10} =$	
7.	22	$5\frac{2}{18} + 1\frac{1}{9} =$	
8.	21	$1\frac{1}{8} + 2\frac{1}{4} =$	
9.	21	$1\frac{6}{38} + 4\frac{7}{19} =$	
10.	20	$3\frac{18}{42} + 4\frac{7}{14} =$	
11.	15	$4\frac{2}{30} + 2\frac{1}{15} =$	
12.	8	$1\frac{4}{9} + 1\frac{1}{18} =$	
13.	4	$7\frac{2}{7} + 7\frac{3}{14} =$	
14.	3	$2\frac{1}{9} + 3\frac{1}{3} =$	
15.	4	$2\frac{6}{14} + 1\frac{3}{7} =$	
16.	8	$8\frac{3}{25} + 9\frac{1}{5} =$	
17.	24	$11\frac{22}{82} + 8\frac{14}{41} =$	

Name _____

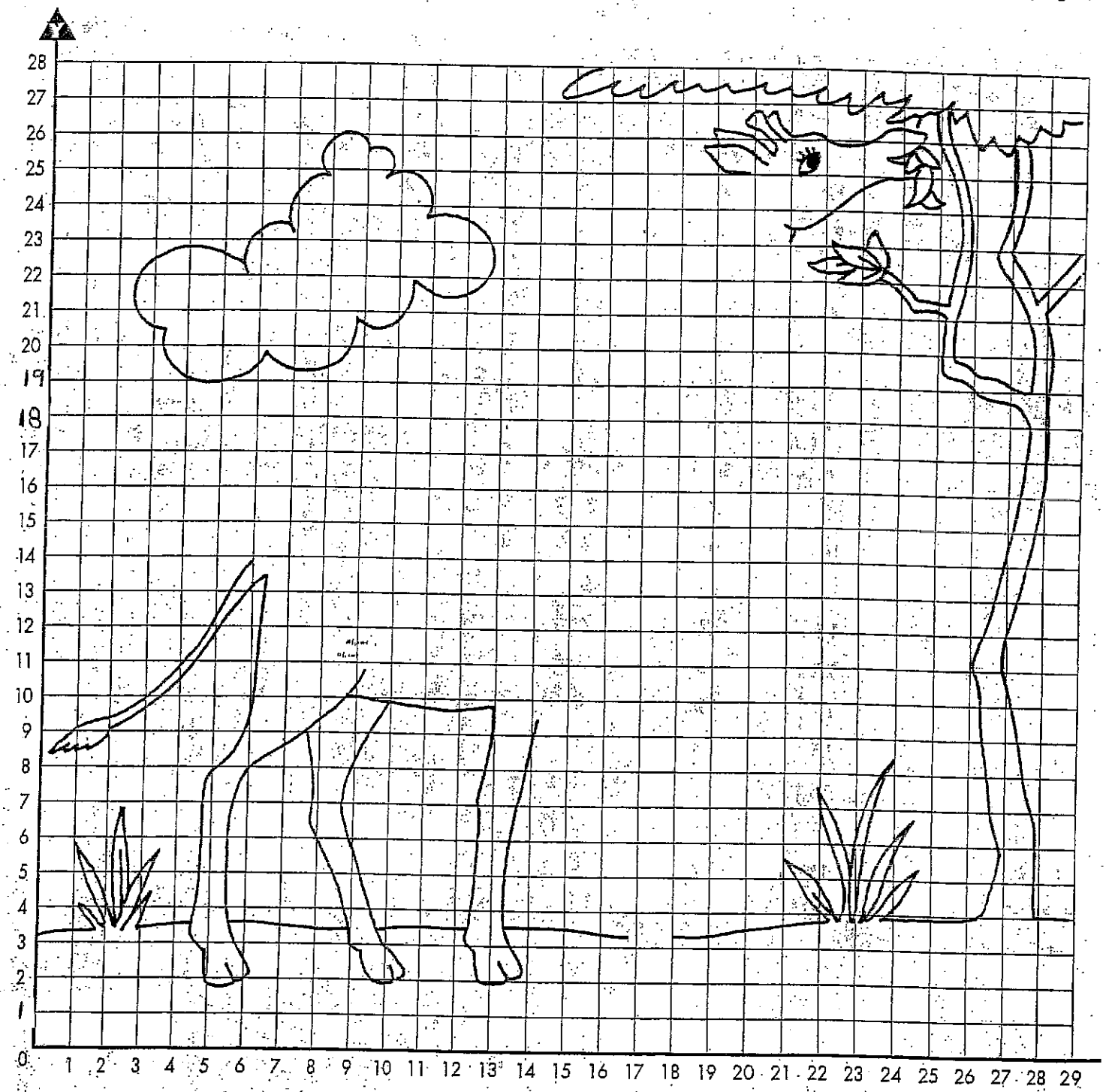
Subtraction of Mixed Fractions With Unlike Denominators

Zoo Friends

Which animal in the zoo never stands up for its friends when they are in trouble?

_____

To find the answer, solve the problems on page 52. Then plot the ordered pairs and connect the points. The picture you make will help you solve the riddle. (The answer is upside down at the bottom of this page.)



Answer: A giraffe: It's tired of sticking its neck out.

Name _____

Subtraction of Mixed Fractions With Unlike Denominators 

Zoo Friends

1. Look at number 1, below. The number in the first column is the X coordinate in an ordered pair.
2. On a separate sheet of paper, solve the problem in the second column. Rename the answer in lowest terms. The denominator in the answer is the Y coordinate.
3. Write the X and Y coordinates in the third column to make an ordered pair. The first one has been done for you.
4. Determine the ordered pairs for the rest of the chart.
5. Plot the ordered pairs on the graph on page 51 in the order they are given. Then use a straightedge to connect the points in the order you plotted them. When you come to the word "STOP," start a new line. Can you solve the riddle?

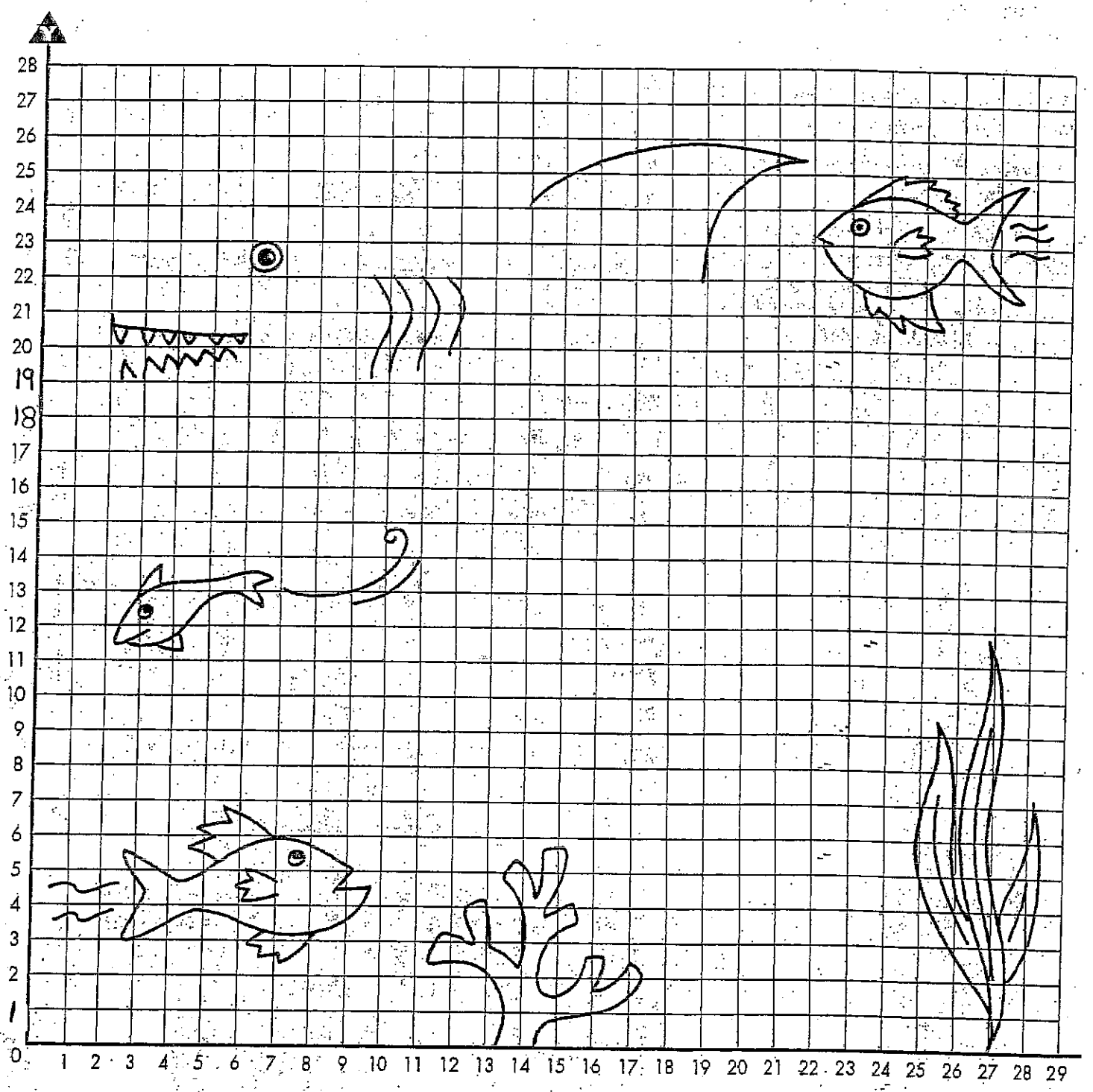
	X Coordinate	Y Coordinate	Ordered Pair
1.	6	$8\frac{4}{7} - 2\frac{1}{2} = 6\frac{1}{14}$	(6, 14)
2.	7	$6\frac{4}{6} - 5\frac{1}{5} =$	
3.	11	$7\frac{9}{16} - 3\frac{1}{4} =$	
4.	13	$9\frac{5}{9} - 2\frac{1}{2} =$	
5.	15	$8\frac{8}{19} - 7\frac{2}{38} =$	
6.	17	$4\frac{2}{3} - 1\frac{3}{21} =$	
7.	20	$3\frac{11}{25} - 1\frac{1}{5} =$	STOP
8.	21	$5\frac{5}{12} - 4\frac{1}{24} =$	
9.	19	$2\frac{12}{57} - 2\frac{1}{19} =$	
10.	16	$9\frac{3}{7} - 8\frac{3}{14} =$	
11.	16	$6\frac{2}{4} - 3\frac{1}{8} =$	
12.	17	$7\frac{5}{12} - 5\frac{1}{2} =$	
13.	18	$9\frac{8}{18} - 9\frac{1}{9} =$	
14.	19	$6\frac{5}{6} - 1\frac{1}{18} =$	
15.	18	$5 - 2\frac{1}{2} =$	
16.	17	$4 - 2\frac{1}{3} =$	
17.	16	$3\frac{10}{12} - 2\frac{4}{6} =$	
18.	14	$8\frac{9}{10} - 1\frac{1}{5} =$	
19.	13	$11\frac{9}{10} - 2\frac{4}{5} =$	

Name _____

Giant Fish

What do you call a giant fish that never misses its target? _____

To find the answer, solve the problems on page 54. Then plot the ordered pairs and connect the points. The picture you make will help you solve the riddle. (The answer is upside down at the bottom of this page.)



Answer: a sharp (shark) shooter

Name _____

Giant Fish

1. Look at number 1, right. The number in the first column is the X coordinate in an ordered pair.
2. On a separate sheet of paper, solve the problem in the second column. Rename the answer in lowest terms. The numerator in the answer is the Y coordinate.
3. Write the X and Y coordinates in the third column to make an ordered pair. The first one has been done for you.
4. Determine the ordered pairs for the rest of the chart.
5. Plot the ordered pairs on the graph on page 53 in the order they are given. Then use a straightedge to connect the points in the order you plotted them. Can you solve the riddle?

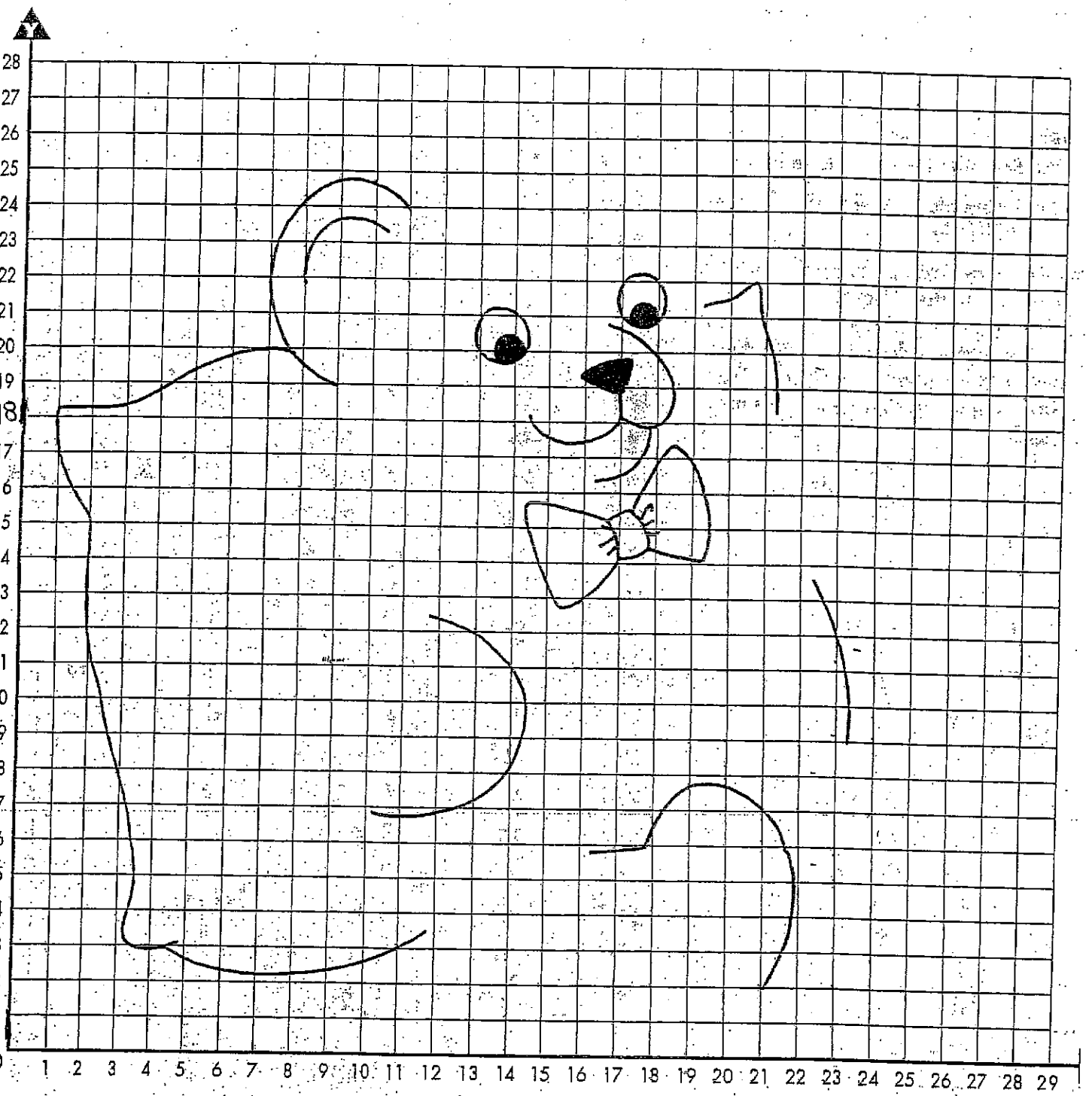
	X Coordinate	Y Coordinate	Ordered Pair
1.	8	$\frac{5}{7} \times \frac{4}{7} = \frac{20}{49}$	(8, 20)
2.	2	$\frac{7}{10} \times \frac{3}{4} =$	
3.	1	$\frac{11}{13} \times \frac{2}{5} =$	
4.	4	$\frac{6}{11} \times \frac{4}{5} =$	
5.	9	$\frac{5}{7} \times \frac{5}{9} =$	
6.	14	$\frac{2}{5} \times \frac{12}{13} =$	
7.	23	$\frac{4}{9} \times \frac{5}{9} =$	
8.	26	$\frac{4}{3} \times \frac{4}{9} =$	
9.	26	$\frac{3}{5} \times \frac{13}{9} =$	
10.	25	$\frac{5}{17} \times \frac{2}{1} =$	
11.	22	$\frac{8}{9} \times \frac{7}{12} =$	
12.	26	$\frac{5}{6} \times \frac{3}{5} =$	
13.	17	$\frac{3}{1} \times \frac{2}{17} =$	
14.	17	$\frac{1}{19} \times \frac{7}{1} =$	
15.	15	$\frac{3}{2} \times \frac{7}{12} =$	
16.	11	$\frac{9}{11} \times \frac{2}{2} =$	
17.	6	$\frac{5}{7} \times \frac{2}{7} =$	
18.	10	$\frac{11}{3} \times \frac{3}{28} =$	
19.	16	$\frac{4}{13} \times \frac{5}{2} =$	
20.	19	$\frac{9}{10} \times \frac{4}{4} =$	
21.	21	$\frac{2}{7} \times \frac{5}{13} =$	
22.	21	$\frac{6}{17} \times \frac{4}{2} =$	
23.	18	$\frac{3}{8} \times \frac{5}{7} =$	
24.	12	$\frac{17}{1} \times \frac{1}{19} =$	
25.	10	$\frac{2}{10} \times \frac{17}{5} =$	
26.	7	$\frac{5}{8} \times \frac{3}{8} =$	
27.	8	$\frac{17}{12} \times \frac{3}{5} =$	
28.	3	$\frac{9}{5} \times \frac{2}{5} =$	
29.	2	$\frac{38}{4} \times \frac{2}{20} =$	
30.	8	$\frac{5}{11} \times \frac{4}{11} =$	

Name _____

Mystery Bear

What kind of bear never eats food but is always stuffed? _____

To find the answer, solve the problems on page 56. Then plot the ordered pairs and connect the points. The picture you make will help you solve the riddle. (The answer is upside down at the bottom of this page.)



Answer: a teddy bear

Name _____

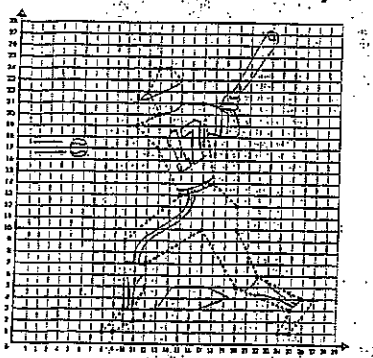
Mystery Bear

1. Look at number 1, right. The number in the first column is the X coordinate in an ordered pair.
2. On a separate sheet of paper, solve the problem in the second column. Rename the answer in lowest terms. The numerator in the answer is the Y coordinate.
3. Write the X and Y coordinates in the third column to make an ordered pair. The first one has been done for you.
4. Determine the ordered pairs for the rest of the chart.
5. Plot the ordered pairs on the graph on page 55 in the order they are given. Then use a straightedge to connect the points in the order you plotted them. When you come to the word "STOP," start a new line. Can you solve the riddle?

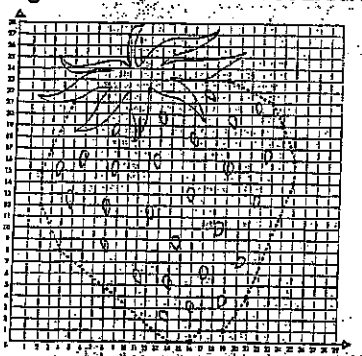
	X Coordinate	Y Coordinate	Ordered Pair
1.	11	$6 \times \frac{4}{25} = \frac{24}{25}$	(11, 24)
2.	16	$5 \times \frac{5}{29} =$	
3.	17	$\frac{13}{29} \times 2 =$	
4.	19	$\frac{26}{62} \times 2 =$	
5.	20	$\frac{5}{27} \times 5 =$	
6.	20	$23 \times \frac{1}{28} =$	
7.	19	$\frac{11}{81} \times 2 =$	
8.	20	$\frac{1}{20} \times 19 =$	
9.	19	$17 \times \frac{1}{45} =$	
10.	21	$\frac{9}{19} \times 2 =$	
11.	22	$1 \times \frac{19}{30} =$	
12.	23	$19 \times \frac{2}{60} =$	
13.	25	$17 \times \frac{2}{40} =$	
14.	25	$5 \times \frac{3}{19} =$	
15.	21	$\frac{1}{24} \times 13 =$	
16.	23	$9 \times \frac{5}{50} =$	
17.	25	$\frac{6}{64} \times 6 =$	
18.	28	$2 \times \frac{5}{22} =$	
19.	25	$6 \times \frac{4}{40} =$	
20.	22	$\frac{5}{49} \times 7 =$	STOP
21.	21	$2 \times \frac{2}{6} =$	
22.	15	$1 \times \frac{1}{34} =$	
23.	10	$\frac{5}{9} \times 1 =$	
24.	10	$7 \times \frac{1}{12} =$	
25.	8	$2 \times \frac{9}{20} =$	
26.	8	$3 \times \frac{4}{13} =$	
27.	10	$\frac{8}{19} \times 2 =$	
28.	9	$19 \times \frac{1}{25} =$	

Answers

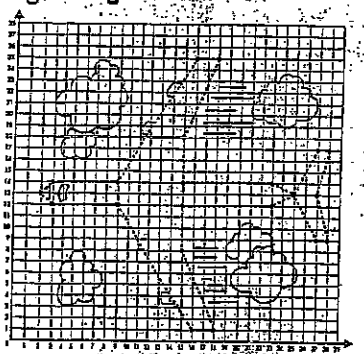
Page 5: **Baseball and Birthdays**



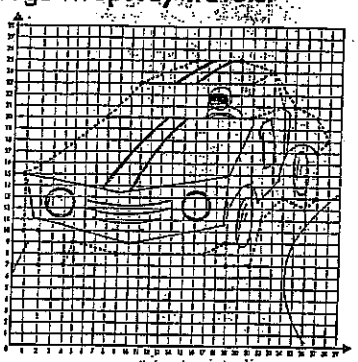
Page 7: **The Breakfast of Scarecrows**



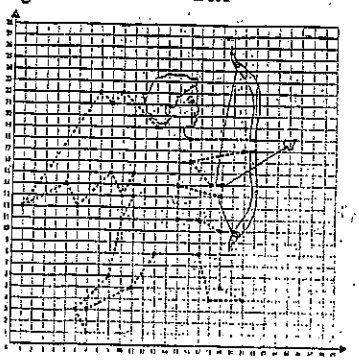
Page 9: **High Flier**



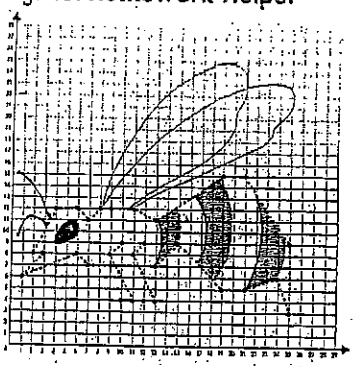
Page 11: **Speedy Traveler**



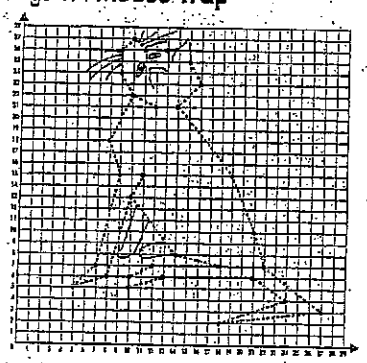
Page 13: **Heart Attack**



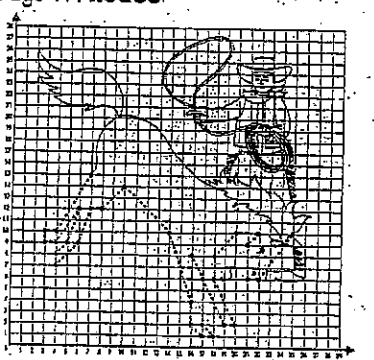
Page 15: **Homework Helper**



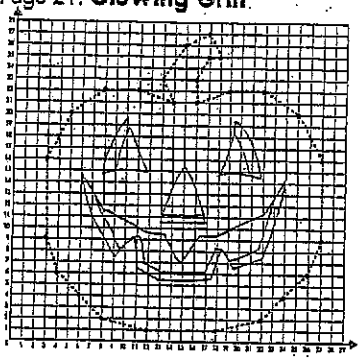
Page 17: **Mouse Trap**



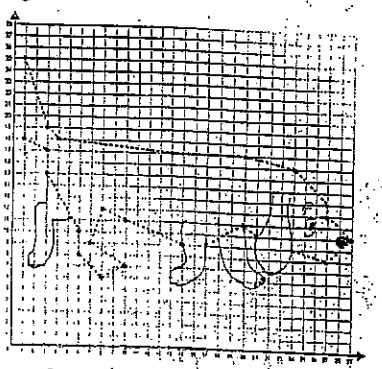
Page 19: **Rodeo**



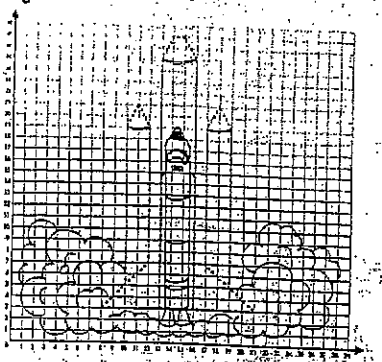
Page 21: **Glowing Grin**



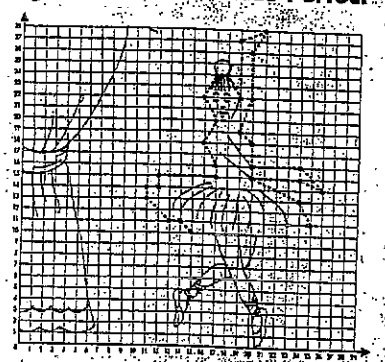
Page 23: **New Job**



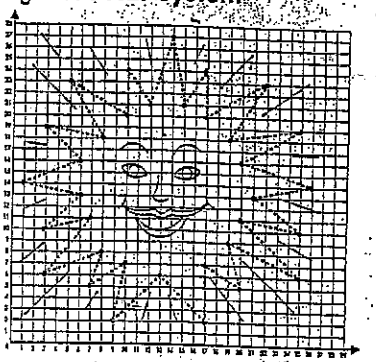
Page 25: **Take Off!**



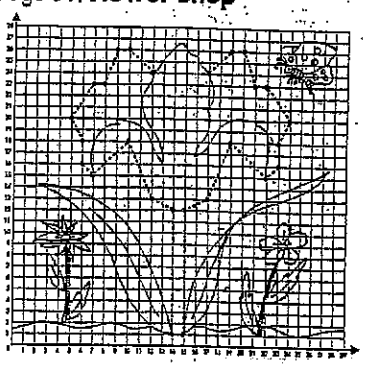
Page 27: **Practice Makes Perfect**



Page 29: **Solar System**

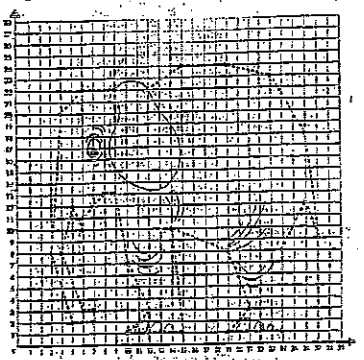


Page 31: **Flower Shop**

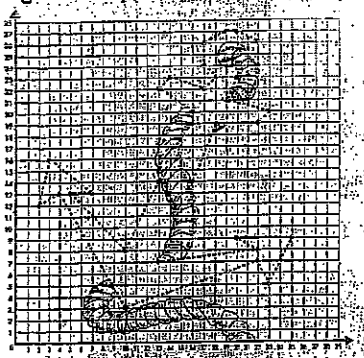


Answers

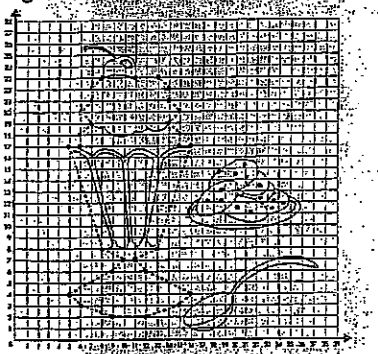
Page 33: **Vacation**



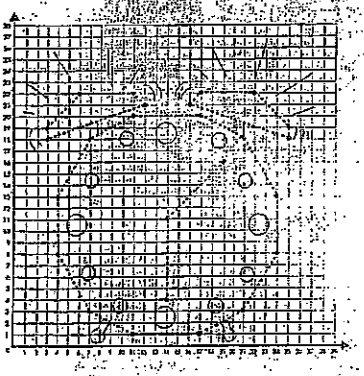
Page 35: **Ship's Friend**



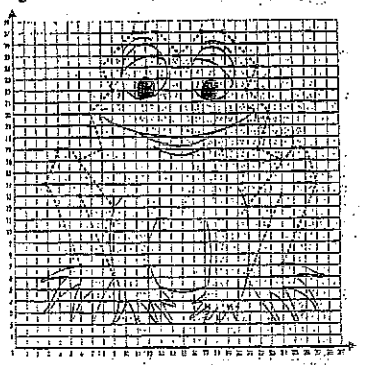
Page 37: **Ice Cream Parlor**



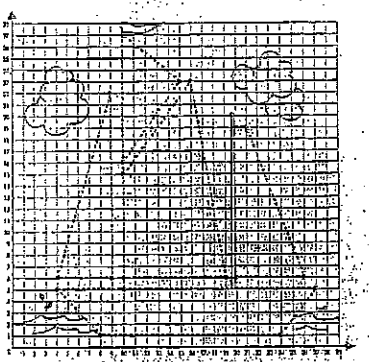
Page 39: **What Am I?**



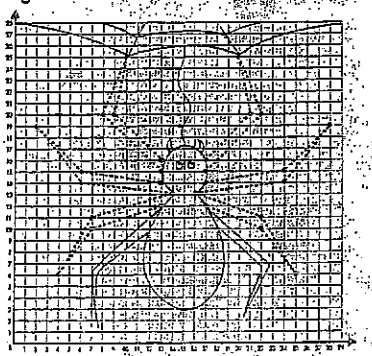
Page 41: **Lost Job**



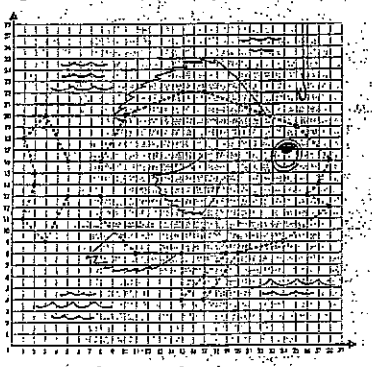
Page 43: **Boating**



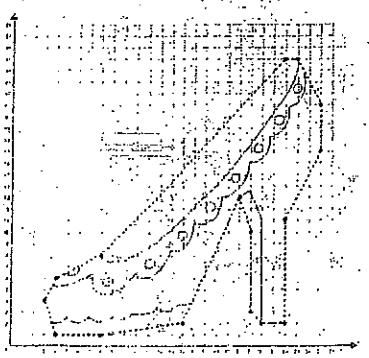
Page 45: **World Wide Web**



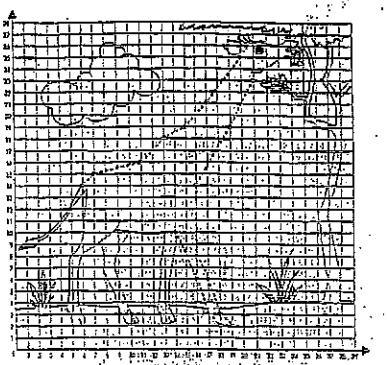
Page 47: **Bad Habits**



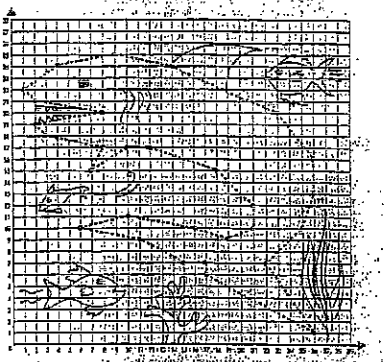
Page 49: **Shoemaker**



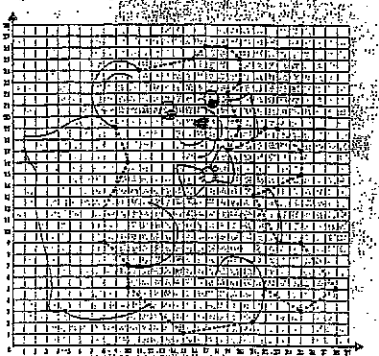
Page 51: **Zoo Friends**



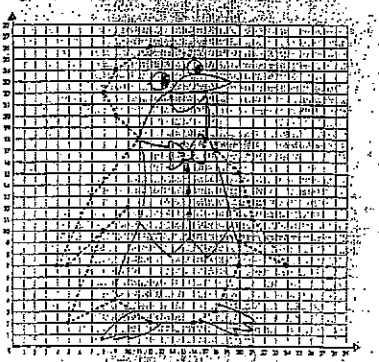
Page 53: **Giant Fish**



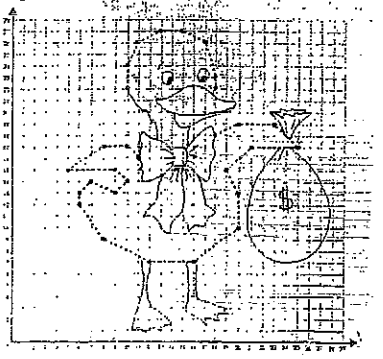
Page 55: **Mystery Bear**



Page 57: **Pierre the Great**

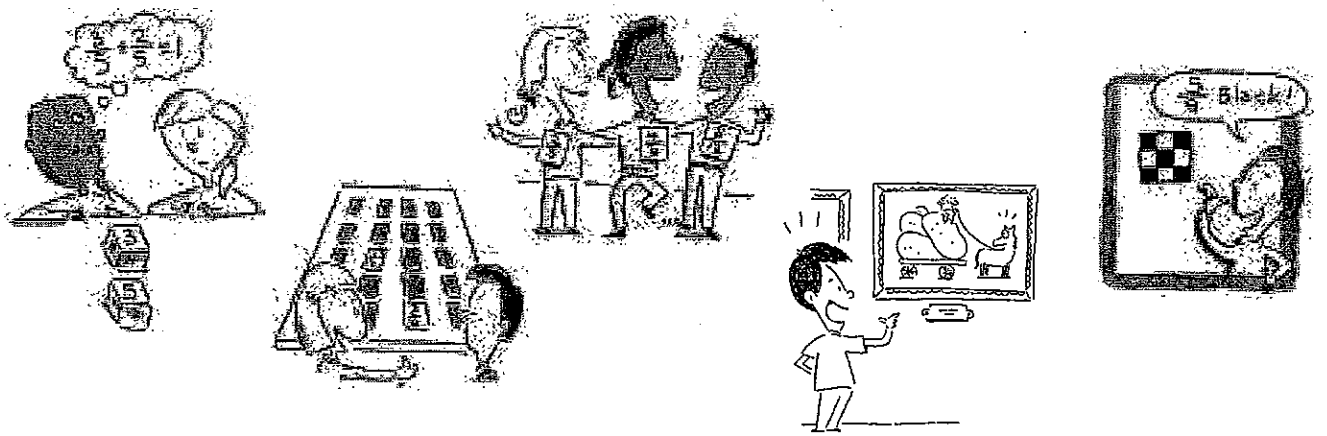


Page 59: **Banker**



MEGA-FUN FRACTIONS

by Marcia Miller and Martin Lee



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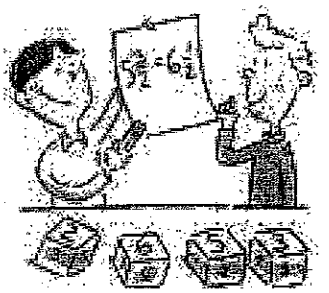

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Contents

About This Book

NCTM Standards

In the 2000 edition of *Principles and Standards for School Mathematics*, the National Council of Teachers of Mathematics (NCTM) states that students in grades 3–5 should:

- Develop understanding of fractions as parts of unit wholes, as parts of a collection, as locations on number lines, and as divisions of whole numbers
- Use models, benchmarks, and equivalent forms to judge the size of fractions
- Develop and use strategies to estimate computations involving fractions in situations relevant to students' experience
- Use visual models, benchmarks, and equivalent forms to add and subtract commonly used fractions

Our Goal

We have written *Mega-Fun Fractions* to provide in one resource a variety of ways for you to immerse your students in fraction concepts. All activities address one or more of the NCTM fraction standards listed above. The range of fraction lessons includes hands-on explorations and activities that invoke problem solving, reasoning and proving, communicating, connecting, and representing fractions. Cross-curricular activities link fractions to language arts, music, science, art, and social studies.

We hope that as you use the ideas in this book in your classroom, your students will develop a deeper understanding of fractions and become more comfortable with this strand of the mathematics curriculum. Our goal is to foster a strong conceptual understanding that, we believe, will lead to greater ease in working with fractions and rational numbers at more advanced levels.

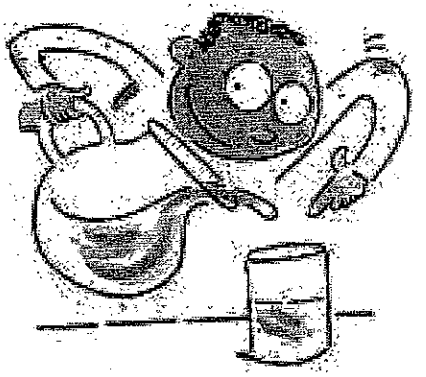
The Format

Mega-Fun Fractions offers activities written directly to the student as well as guided plans to help you present activities to your whole class, to small groups, or to individuals. Each lesson begins with a question you may pose to students, a learning objective, a list of necessary materials, sequenced steps to follow (The Plan), and several follow-up ideas. The back of the book has three pages of Fraction Quickies—additional ideas presented in an abbreviated manner. You will also find helpful reproducibles and a Fraction Self-Evaluation Form that students complete. Answers appear at the end of the book.

Teacher Tips

- The activities in *Mega-Fun Fractions* are organized according to a very broad outline, and they are presented in this order:
  - fractions of a region
  - fractions of a set
  - equivalent fractions
  - comparing, ordering, and rounding fractions
  - fractions and measurement
  - adding, subtracting, and multiplying fractions
  - culminating activities
- Feel free to work through the book in any order that suits you. Revisit activities at any time during the year.
- You may find that some fraction activities are too advanced for your class, whereas others may be too basic. Revise, adapt, or extend tasks to suit your students' needs.
- You may choose to use the tasks in this book as full lessons, warm-ups, homework assignments, math corner activities, group projects, informal assessments, or portfolio assessments. It's up to you!
- Determine the best grouping to suit your teaching style, as well as the learning styles and levels of your students. Invite students to work individually, in pairs, in small groups, or as an entire class. Be sure to allow time for sharing and comparing.
- Encourage sharing, discussing, analyzing, and summarizing of students' findings. Establish an atmosphere that promotes intellectual exploration and an appreciation of and respect for one another as mathematicians, thinkers, and problem-solvers.
- You may wish to duplicate and distribute the fraction strips (page 84) to provide students with a ready reference for comparing and ordering fractions. Have students color each strip a different color for visual ease.
- The Prepare to Share feature on many student pages stimulates students to plan what they wish to say when you summarize the activity. You may wish to ask students to record their responses and ideas in a math log.
- Whenever you make manipulatives, such as fraction cards or fraction number cubes, keep them for use in subsequent activities. If space permits, set up a Fractions Center in your classroom where you can store such materials.

HALFNESS



Can you open a book to the halfway page?
Can you pour half a glass of water?
Can you walk halfway to the classroom door from your seat?

GOAL: Students use their visual estimation skills to identify half of a region.

MATERIALS: student page 8, various books, water glasses, dried beans or water, coins or counters, string, pencils, various measurement tools (rulers, tape measures, scales, and so on)

THE PLAN

1. Begin by brainstorming with students everyday situations in which people make a quick visual estimate of half. For example:
   - I'll take half a piece, please.
   - Fill it up about halfway.
   - Hang it up about halfway between here and the door.
   - The book goes in the middle of the top shelf.
2. Continue by having students suggest other examples that involve estimating about half of a space, a distance, or a quantity.
3. Divide the class into pairs or small groups. Give each group a set of materials. Then direct groups to tackle the visual estimation activities on page 8. Have students try each task more than once, and note whether their estimates of half improve or stay about the same.
4. As students work, guide them to figure out ways to use suitable measurement tools to verify how close to half their estimates actually are.

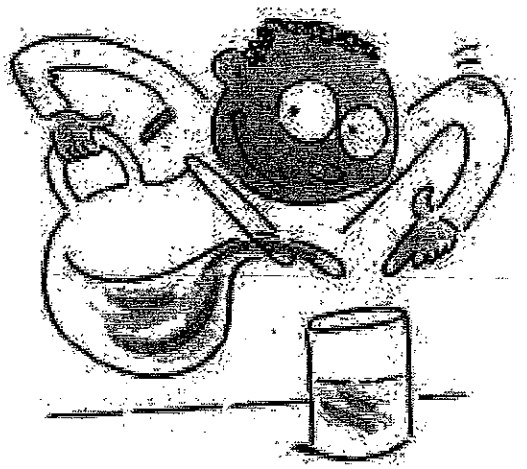
TEACHING TIPS

- Have students compare their estimates and strategies with those of other groups.
- Invite discussion of students' strengths and weaknesses in visual estimation.
- Ask students to describe orally or write a description of how and why their estimates changed with subsequent repetitions.
- Invite students to create other tasks in which they visually estimate half of something.
- Challenge students to visually estimate "half again" of a distance or quantity.

Name _____ Date _____

HALFNESS

Your senses can help with fractions.
It's great if you can visually estimate half.



Work in pairs or small groups. Try each task three times to sharpen your fraction estimating skills. Judge how close your estimates are. Do your estimates get better the second and third time?

- Choose a book of any thickness. Open it to its middle page.
- Fill a glass halfway with beans or water.
- Place two coins or counters a distance apart on the floor or on a table. Then place another counter halfway between them.
- Have two classmates stand a reasonable distance apart. Stand halfway between them.
- Choose something within the classroom, at a distance from you. Walk halfway there. Mark where you started and where you stopped.
- Use string to make a large, closed irregular shape on a desktop. Place a row of pencils across it to divide the shape in half.
- Have a classmate stand tall. Show where half his or her height is.

PREPARE TO SHARE

How did you check your visual estimates?
Did your estimates get better as you went along? Explain.
Which kind of visual estimation was the hardest for you? The easiest?

Fill All Four

Play a two-person game that involves filling regions of a hexagon.

GOAL: Students use visual and spatial reasoning skills to fill hexagonal regions.

MATERIALS: student page 11, number cube (p. 85), pattern blocks (p. 86)

TEACHING TIPS

- Go over the rules of the game with students. Have each student choose a partner. Provide each student with student page 11 and enough pattern blocks to play. As an alternative, students might play in two-person teams.
- Give each student a blank number cube. Guide them as they fill in the cube according to the directions on page 11.
- Challenge students to name the fractional amount of the hexagons that are filled at any given point in the game.
- Invite students to play several times to sharpen their strategies for mastering the game.
- Have students compare their game-playing strategies.

What's in Petal, Mississippi?

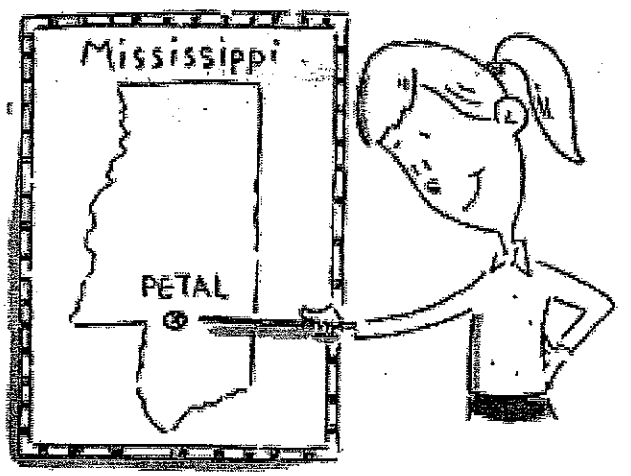
Identify fractions of regions to answer a riddle.

GOAL: Students name fractional parts of a region.

MATERIALS: student page 12

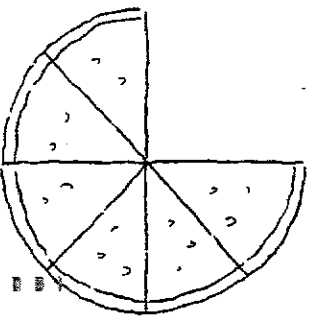
TEACHING TIPS

- Duplicate and distribute copies of page 12 to each student. Explain that if students correctly name the fractional part of each balloon and fill in the correct number in the coded answer below, they will figure out the answer to the question about Petal, Mississippi.
- Invite students to develop variations of this puzzle for classmates.



What's Left?

Use visual estimation to describe fractional parts.



GOAL: Students apply visual and spatial reasoning to name fractional parts of foods.

MATERIALS: student page 13

TEACHING TIPS

- Duplicate and distribute copies of page 13 to each student. Explain to students that they should use visual and spatial reasoning to answer each food question.
- Invite students to develop variations of this page for classmates.

Fractions up a Tree

Use visual and spatial estimation to follow fraction clues.

GOAL: Students draw a hole that represents where a woodpecker pierced a tree.

MATERIALS: student page 14

TEACHING TIPS

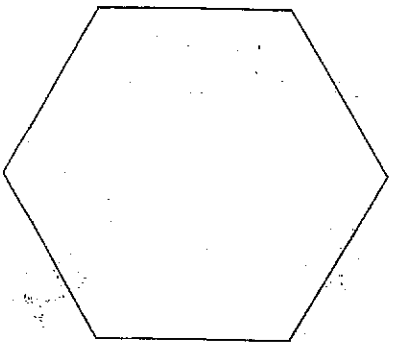
- Duplicate and distribute copies of page 14 to each student. Explain that students will use visual and spatial reasoning to draw the position of the woodpecker hole in each tree.
- Invite students to develop variations of this task for classmates.
- Translate this exercise into three dimensions by having students do similar tasks with drinking straws, cardboard tubes, interlocking blocks, or clay cylinders.

Name_____ Date_____

Fill All Four

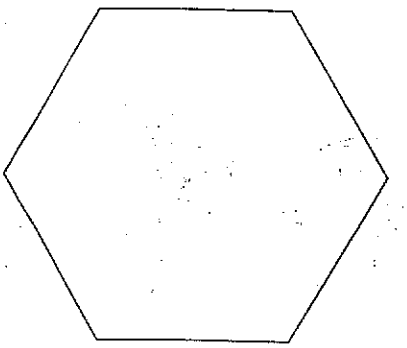
Play a two-person game. Each player needs this game board, pattern blocks, and a number cube labeled so that one face says $\frac{1}{2}$, two faces say $\frac{1}{3}$, and three faces say $\frac{1}{6}$.

The object of the game is to fill the four hexagons with fractional parts. Each hexagon = 1 whole.



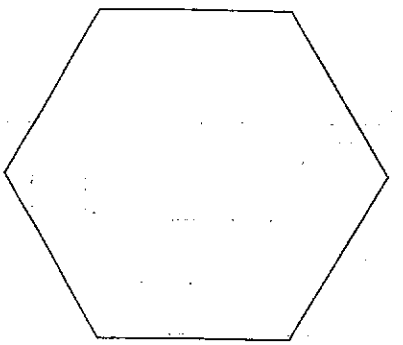
Rules

1. Before you play, find out which pattern block fills $\frac{1}{2}$ the hexagon. Determine which pattern block fills $\frac{1}{3}$ of the hexagon, and which fills $\frac{1}{6}$ of it. Use these pattern blocks to play.



2. Decide who goes first. That player rolls the fraction number cube and takes a pattern block for the fraction shown. The player puts that block inside any hexagon where it will fit. Once a piece has been placed, it may not be moved.

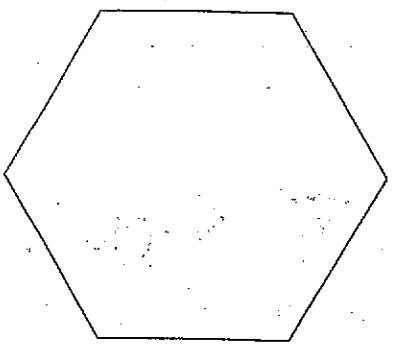
3. The next player rolls, takes the corresponding pattern block, and puts it anywhere it will fit.



4. In turn, players keep rolling and adding pattern blocks to the hexagons to fill all four of them.

5. Any player who rolls a fraction that does not fit in an available space may roll again. If the second roll does not fit either, that player's turn ends.

6. The first player to fill all four hexagons wins.



Strategy Hint

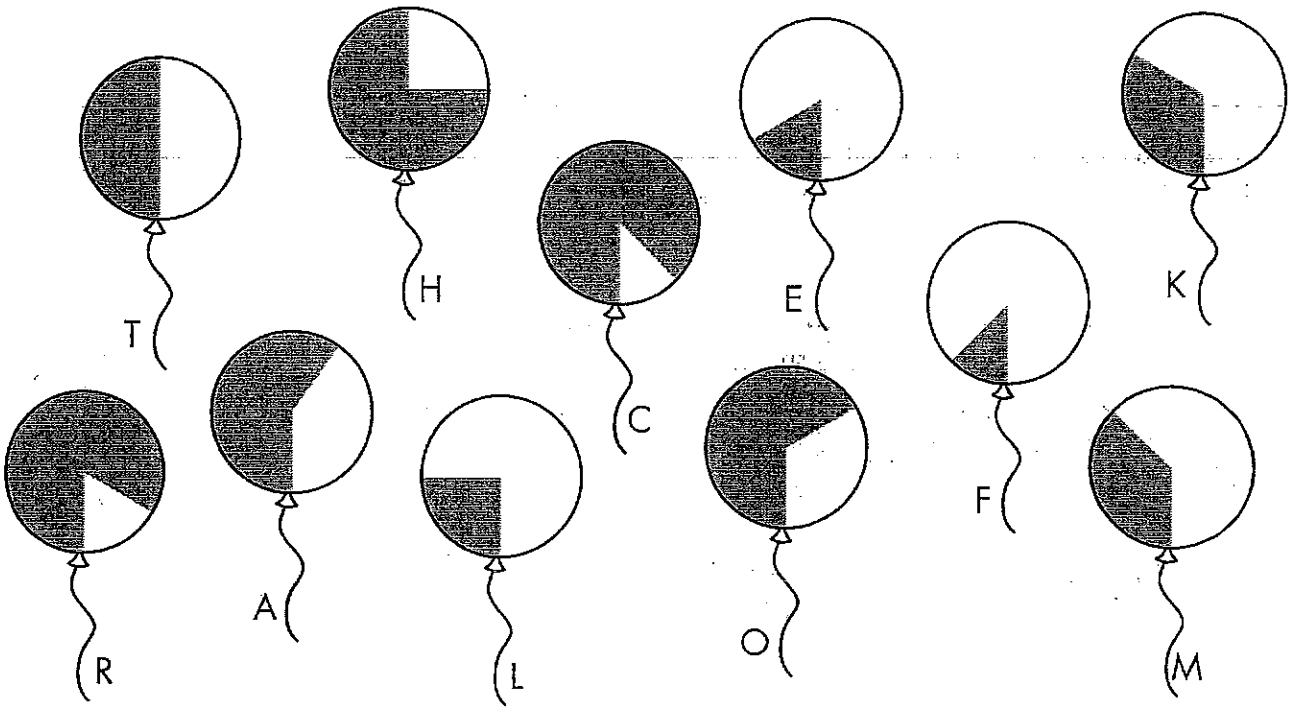
It's okay to mix halves, thirds, and sixths in one hexagon as long as each piece clearly fits.

Name _____ Date _____

What's in Petal, Mississippi?

Since 1976 the town of Petal, Mississippi, has had something that no other town has. What is it?

To find out, look at the balloons. Above each fraction, write the letter of the balloon whose shaded area shows that fractional amount.



$\frac{1}{2}$	$\frac{3}{4}$	$\frac{1}{6}$	$\frac{7}{8}$	$\frac{3}{4}$	$\frac{1}{6}$	$\frac{7}{8}$	$\frac{1}{3}$	$\frac{1}{6}$	$\frac{5}{6}$	

$\frac{3}{4}$	$\frac{3}{5}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{2}{3}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{3}{5}$	$\frac{3}{8}$	$\frac{1}{6}$		

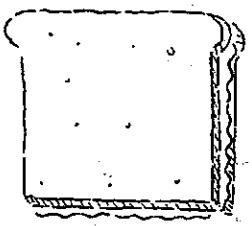
Prepare to Share

What would you expect to see at this unique place in Petal, Mississippi?

Name _____ Date _____

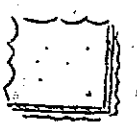
WHAT'S LEFT?

Estimate to figure out about how much food is left. Then write the fraction that is closest to that amount.



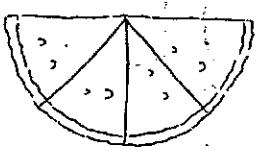
Norm's sandwich

1. Norm didn't finish his sandwich. About what fraction of it remains? Write $\frac{1}{4}$, $\frac{1}{2}$, or $\frac{3}{4}$.
Norm left about _____.

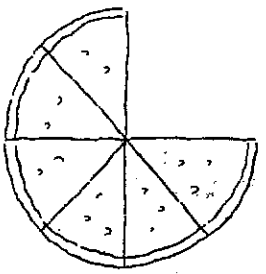


What's left

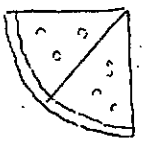
2. Some people didn't finish their pizzas. About what fraction of each pizza is left? Write $\frac{1}{4}$, $\frac{1}{2}$, or $\frac{3}{4}$.



a. _____

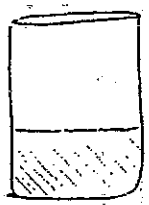


b. _____

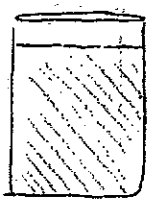


c. _____

3. There is some juice left in each glass. About how full is each glass of juice? Write $\frac{1}{6}$, $\frac{1}{3}$, $\frac{2}{3}$, or $\frac{5}{6}$.



a. _____



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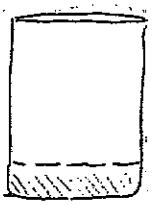
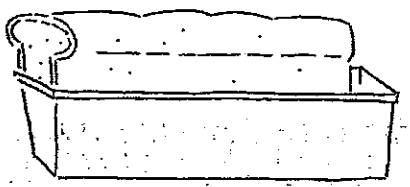
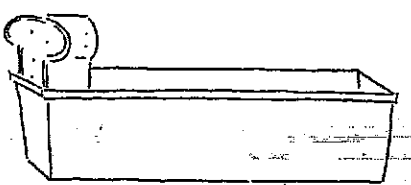


c. _____

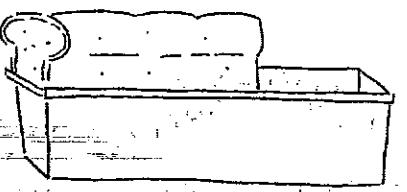
4. About how much of each bread loaf is left? Write $\frac{1}{8}$, $\frac{3}{8}$, $\frac{5}{8}$, or $\frac{7}{8}$.



a. _____



b. _____



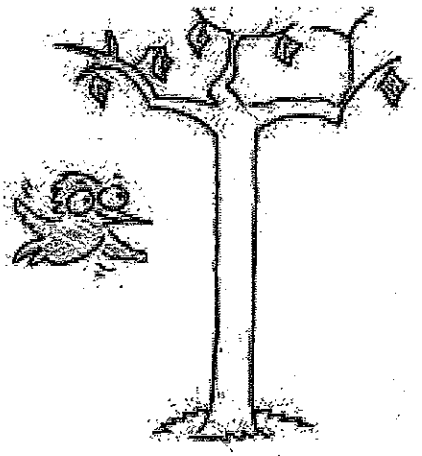
c. _____

Name_____ Date_____

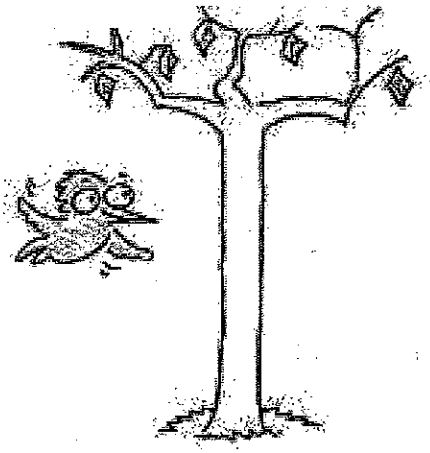
Fractions up a Tree

Hungry woodpeckers pecked each of these trees. Use fraction clues to figure out how far up the trunk they pecked. Draw each hole about where it should be.

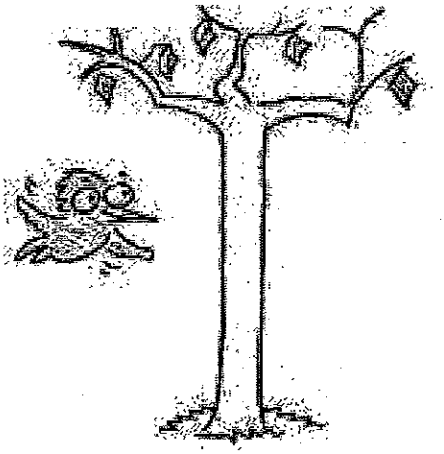
1. About $\frac{3}{4}$ of the way up



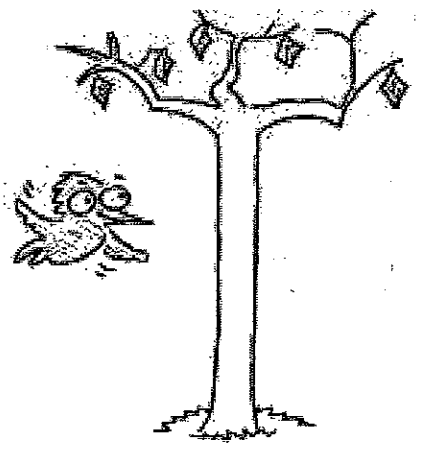
2. About $\frac{1}{2}$ of the way up



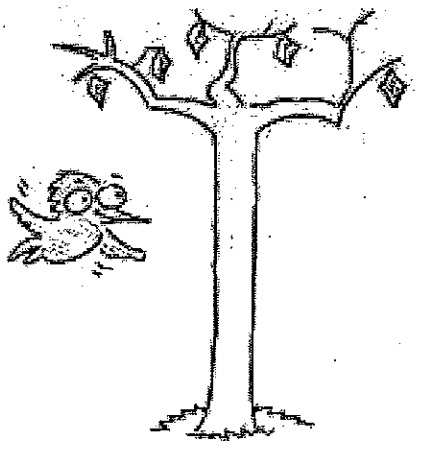
3. About $\frac{1}{5}$ of the way up



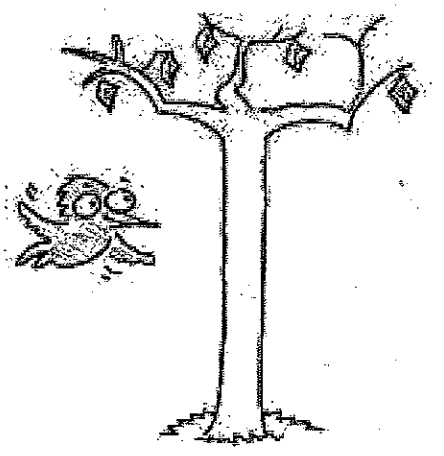
4. About $\frac{5}{8}$ of the way up



5. About $\frac{2}{3}$ of the way up



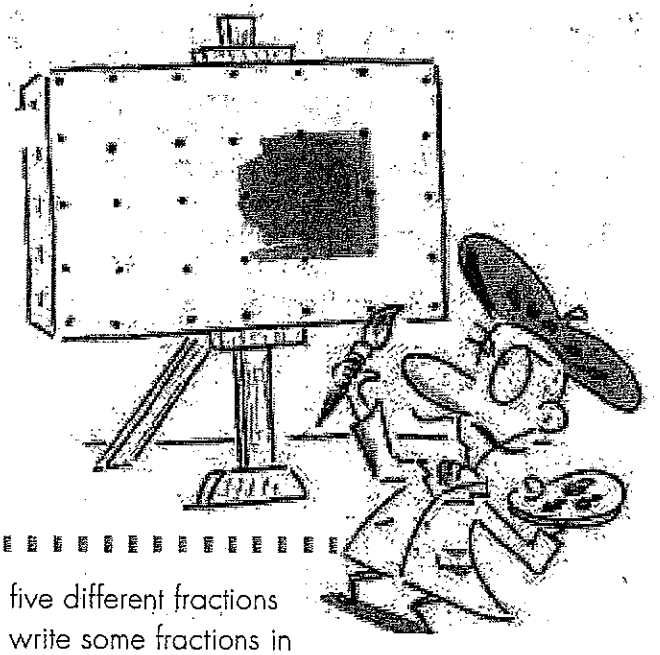
6. About $\frac{1}{3}$ of the way up



Prepare to Share

How did you decide where to draw each hole? Explain.

COLORFUL REGIONS



Can you color a rectangle on dot paper to represent a given fraction?

GOAL: Students practice naming, writing, and drawing fractional parts of a region.

MATERIALS: scrap paper, dot paper (p. 87), rulers, crayons

THE PLAN

1. Divide the class into pairs. Ask each partner to write five different fractions (less than 1) on a piece of scrap paper. They should write some fractions in number form and others in words. Have partners swap their papers.

2. Distribute dot paper and rulers to each student.

3. Have students draw five separate rectangles on their dot paper. Explain that each rectangle drawn represents one whole and that each may be the same size and shape or different. Students will use these rectangles to illustrate the fractions their partners wrote for them.

4. Have students color regions of the five rectangles to show the fractions written. Students may use the rulers to outline the regions and the colored parts.

5. Ask partners to share their drawings and discuss them. Encourage them to work out any discrepancies.

FOLLOW-UP

- Have each pair of students swap their drawings with another pair of students. Each pair should then identify the fractions shown by the colored parts.
- Extend by having them identify two fractions to be colored in the same figure. For example, a student can ask another to color a rectangle $\frac{1}{5}$ blue and $\frac{3}{5}$ yellow. If students are familiar with the concept of common multiples, you may wish to extend the activity by suggesting that partners come up with fractions that have different denominators.
- Challenge students by having them color fractional parts within irregular polygons. It may be useful first to work one together on the overhead projector or chalkboard.

Fraction Chart Puzzle

Can you solve a fraction puzzle?

GOAL: Students assemble a schematic chart that identifies the parts of a fraction.

MATERIALS: student page 17, scissors, glue or tape, plain paper

The Plan

1. Begin by reviewing the names of the parts of a fraction (numerator, denominator, fraction bar). Reinforce the role of each part in giving meaning to the fraction.

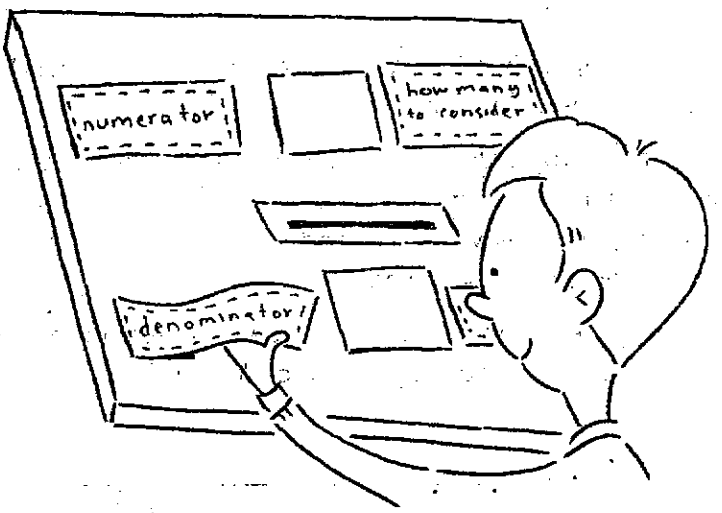
2. Duplicate and distribute copies of page 17. Explain that the puzzle contains a set of scrambled parts of a fraction as well as phrases that describe the function of each part.

3. Provide scissors, glue or tape, and sheets of plain paper. Challenge students to cut out the parts of the fraction puzzle and the descriptive phrases and then reassemble them in proper order to represent a fraction.

4. Display the completed fraction puzzles, or have students keep them in their math notebooks to use as a reference tool.

Follow-Up

- Extend this activity by creating similar puzzles to represent mixed numbers.
- Create an interactive fraction chart using two library pockets fastened to posterboard. Students can form an endless variety of fractions by slipping number cards into the pockets.



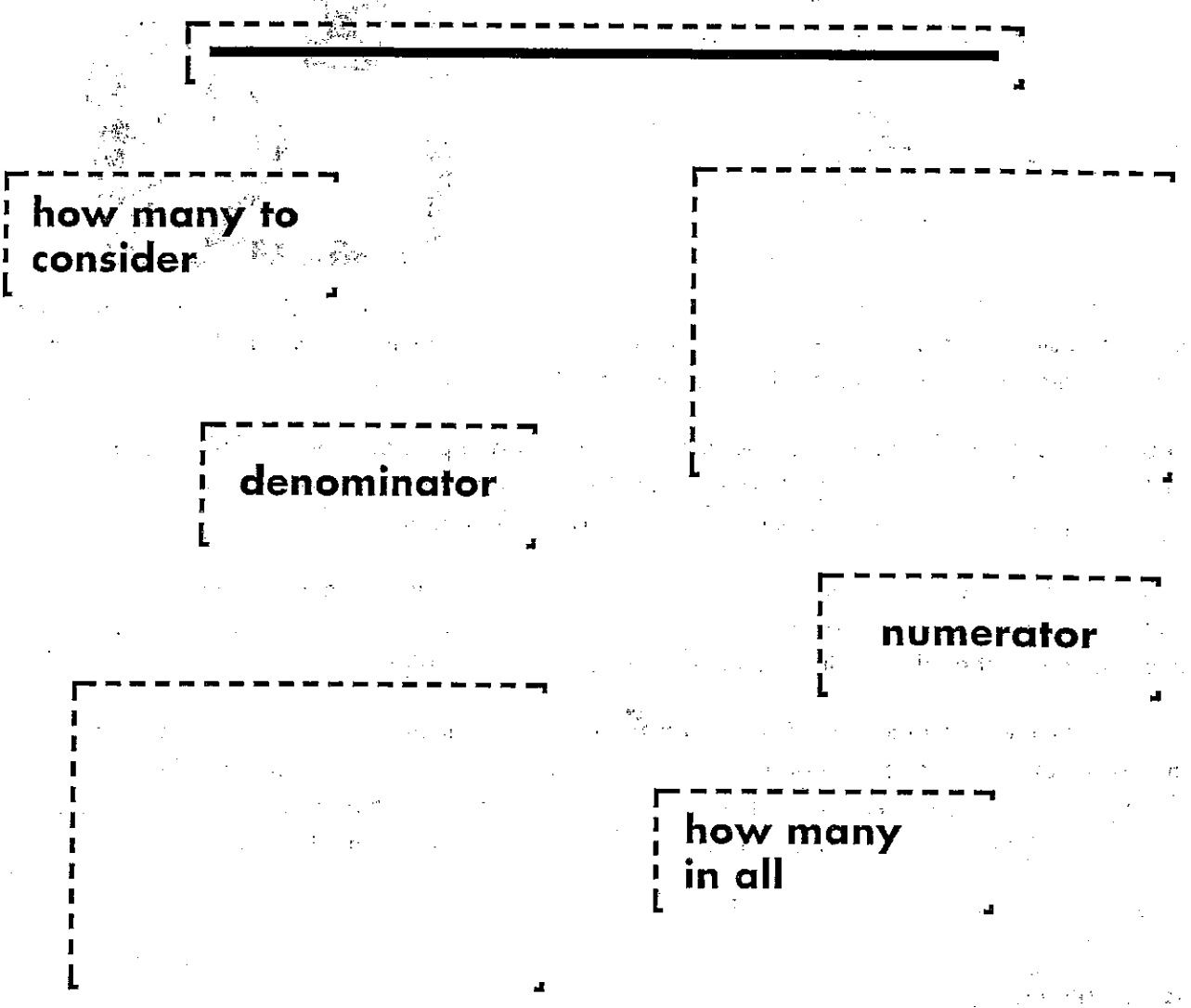
How did you decide where to draw each label? Explain.

Name_____ Date_____

Fraction Chart Puzzle

How can you unscramble these parts to form a fraction model?

Cut out the seven pieces along the dotted lines. On another sheet of paper, glue them in position to form a labeled fraction model.



PREPARE TO SHARE

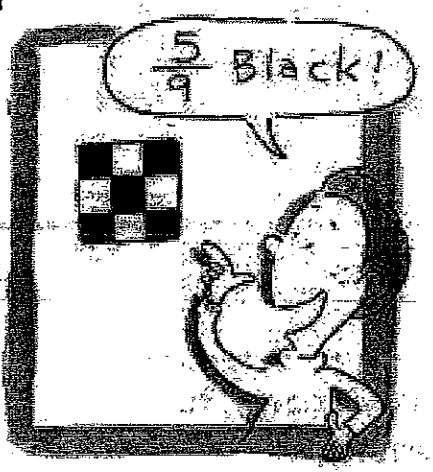
How might you use the completed model to teach others about fractions? Explain on a separate sheet of paper.

Part Art

In how many ways can you use fractions to describe a geometric design?

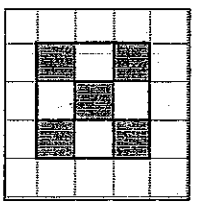
GOAL: Students use fractions to describe geometric designs.

MATERIALS: centimeter grid paper (p. 88), crayons, ruler



THE PLAN

1. On an overhead projector, chart paper, or chalkboard, create the design shown below.



2. Ask students to describe the design by identifying its fractional parts. Students may say, for example, that the design is $\frac{5}{9}$ black. Others may say that it is $\frac{4}{9}$ white. Some may even say that the number of white squares is $\frac{4}{5}$ of the number of black squares. Record students' suggestions.

3. Reproduce and distribute sheets of centimeter grid paper and provide crayons. Tell students to outline a 4 x 4 square on the grid paper. Have them color the small squares within the figure to create a geometric design. Invite them to use as many colors as they wish.

4. Have students write fractions that describe their designs. Encourage them to do so in as many ways as they can. Guide them to see that as they increase the number of colors used in a design, they increase the number of ways in which they can describe that design with fractions.

5. Next, ask students to repeat the process with another 4 x 4 square. This time, have them record their descriptions on separate paper. Then have students swap their designs (but not the descriptions) with a partner. The partners write fractions to describe the design in as many ways as they can. When they are done, partners compare descriptions of each other's design.

6. Have pairs repeat this process using 5 x 5 or 6 x 6 squares.

FOLLOW-UP

- Post students' designs with the fractional descriptions.
- Challenge pairs to envision a simple geometric design on a 4 x 4 square. Then ask each student to give his or her partner a full verbal description of that design, using fractions and directional language (upper left, lower right, and so on). The partner tries to re-create the design described. Have partners swap roles.

COLLABORATIVE QUILTS

How can you use fractions to create and describe unique class quilts?

GOAL: Students apply their understanding of fractional parts to make geometric designs on patches they will combine into one large quilt.

MATERIALS: pictures of various quilts, inch grid paper (p. 89), scissors, crayons or markers, plastic shower curtain or tablecloth to serve as backing for quilt, tape or glue

THE PLAN

1. Display pictures of quilts that reflect a variety of patterns. Ask students to imagine a collaborative class quilt in which each child contributes one or more patches.

2. Reproduce and distribute sheets of inch grid paper and provide crayons. Have students cut the grid paper into 6 x 6 squares so that everyone has an equal-sized patch.

3. Decide with the class on fractional parts to go in the quilt. For example, students can each decorate their patch to represent $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$, $\frac{1}{6}$, or $\frac{1}{8}$. Students can decorate their patches in any way they wish, as long as they can describe it in terms of fractions.

4. As students complete their patches, tape or glue the patches onto the shower curtain or tablecloth backing to form a communal quilt you can display. As an alternative, combine the patches to form a quilt on a bulletin board by connecting them with tacks or staples.

FOLLOW-UP

- Invite students to describe the quilt using fractions. Guide them to describe individual patches, certain rows or columns, border patches, or the entire quilt.
- Have the class work together to create a real quilt by sewing together fabric patches. You might focus on cross-curricular themes, such as history, science, geography, or literature. It may help to invite parent volunteers to assist you with this project.
- Challenge students to analyze existing quilts (actual ones or pictures of them) by describing them in fractional terms.

Pattern Block Proofs

How do pattern blocks reflect the concept of equivalent fractions?

GOAL: Students use pattern blocks to identify relationships among fractions and to explore the concept of equivalent fractions.

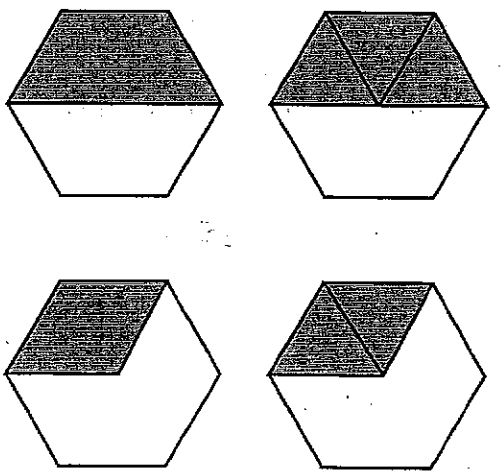
MATERIALS: sets of pattern blocks (p. 86), student pages 21–22

THE PLAN

1. Distribute pattern blocks to students. Allow time for them to examine and identify the blocks in each set. Have students color the shapes as follows: yellow hexagon, red trapezoid, blue parallelogram [or rhombus], red square, white parallelogram [or rhombus], and green triangle.

2. Allow students to create designs with pattern blocks to explore how they fit together. Then have them manipulate the pattern blocks to answer questions, such as:
   - How many green blocks cover a blue block? (*2*)
   - Which red block covers half a yellow block? (*the trapezoid*)
   - How many green triangles cover the red trapezoid? (*3*)
   - How many green triangles cover the yellow hexagon? (*6*)

3. Have students cover half of a yellow block with the red trapezoid. Also have them cover half of another yellow block with green triangles. Guide students to grasp that since the red trapezoid is $\frac{1}{2}$ of the yellow block, and that since 3 green triangles also cover $\frac{1}{2}$ of the yellow block, then it stands to reason that $\frac{3}{6}$ and $\frac{1}{2}$ are equivalent fractions.



4. Now ask students to use the pattern blocks to figure out how many blue blocks cover a yellow, and how many green blocks cover a blue. (*3;2*)

   Guide students to use these facts to prove that $\frac{1}{3} = \frac{2}{6}$.

5. Duplicate and distribute the following pages. Ask students to use the figures to answer the questions at the bottom of the page.

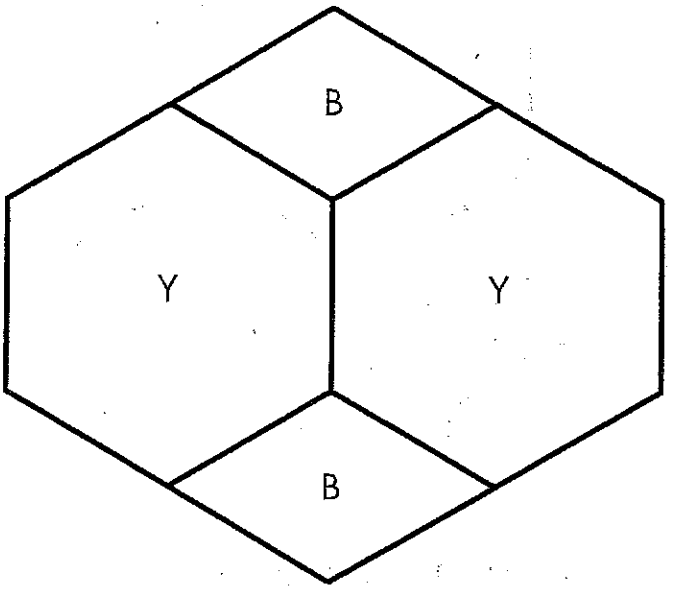
FOLLOW-UP

- Challenge students to use the yellow, blue, and green pattern blocks to prove how many sixths are equivalent to $\frac{2}{3}$. Pose other comparable equivalence questions for students to prove with the pattern blocks.

Name_____ Date_____

Pattern Block Proofs

Work with a partner. Use your pattern blocks to make each figure.
Use what you know about the blocks to answer the questions.



1. What fraction of the whole figure does one blue block cover?_____

   What fraction do two blue blocks cover? _____

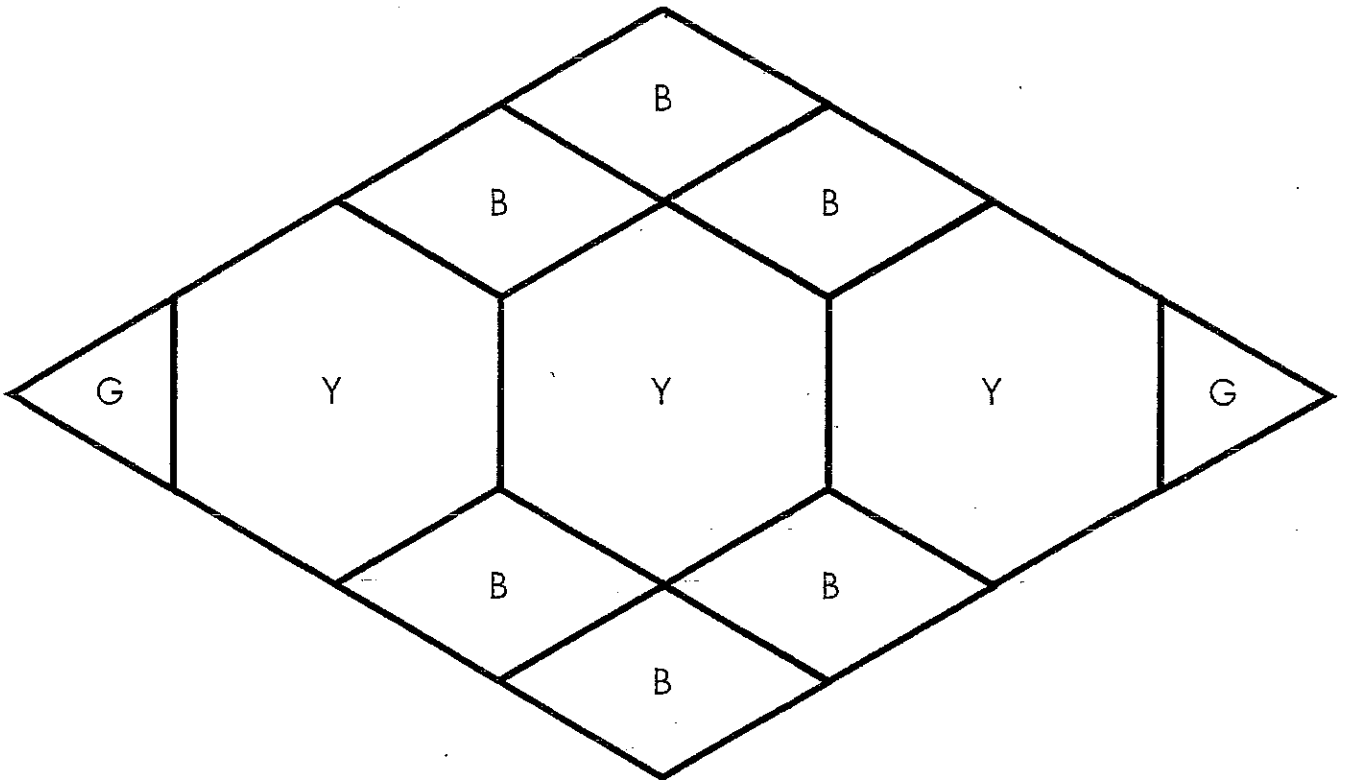
2. What fraction does one yellow block cover?_____

   What fraction do three blue blocks cover?_____

3. What fraction of the figure would two green blocks cover? _____

   What fraction would two red blocks cover? _____

Name _____ Date _____



4. What fraction of the whole figure does one green block cover? _____

   What fraction does one yellow block cover? _____

5. What fraction of the whole figure do three blue blocks cover? _____

   What fraction do three yellow blocks cover? _____

6. Which blocks will cover $\frac{1}{2}$ of the figure? Give as many combinations as you can.

_____

_____

_____

_____

_____

PREPARE TO SHARE

Create a new pattern block figure and make up fraction questions about it.

SHADED SHAPES

How can visual reasoning help you shade the same fractional parts of figures in different ways?

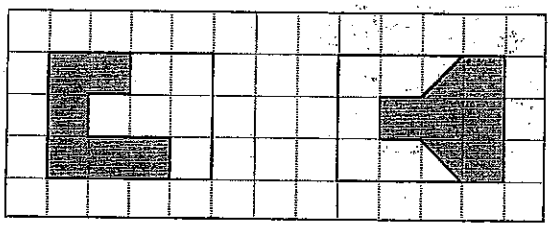
GOAL: Students shade portions of figures to explore the concept of equivalent fractions.

MATERIALS: ruler, centimeter grid paper (p. 88), student page 24

THE PLAN

1. On a grid on an overhead projector, draw several 3 x 4 rectangles. Elicit from students different ways to shade the figures to show $\frac{1}{2}$. Let volunteers do the shading.

2. If students don't suggest it, show how to divide the figure in half diagonally. Then, if it has not yet been suggested, show the following ways to shade $\frac{1}{2}$:



3. Discuss how this shading also represents $\frac{1}{2}$ of the figure. Challenge students to present other ways to shade half of the figure. Have them explain their reasoning.

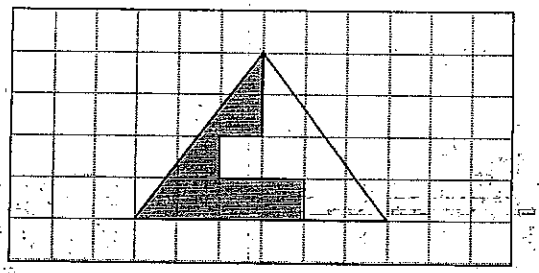
4. Duplicate and distribute page 24 along with several sheets of centimeter grid paper. Have students work in pairs to show the fractions.

5. Invite pairs to share their sketches with others and to explain and discuss their approaches and results.

6. Have pairs share and discuss their solutions to the Brain Tickler.

FOLLOW-UP

⊛ Challenge students to come up with as many ways as they can to shade the same fraction of the figure shown below.



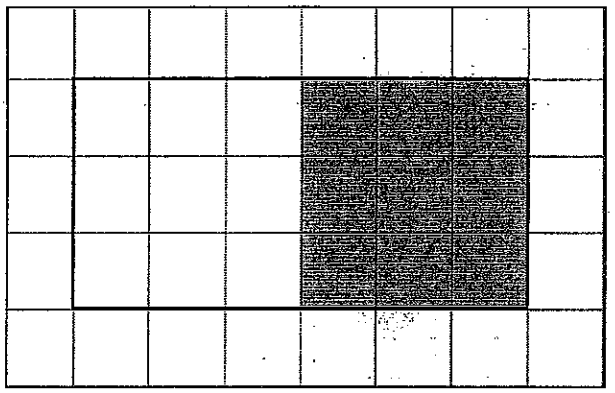
Name _____ Date _____

SHADED SHAPES

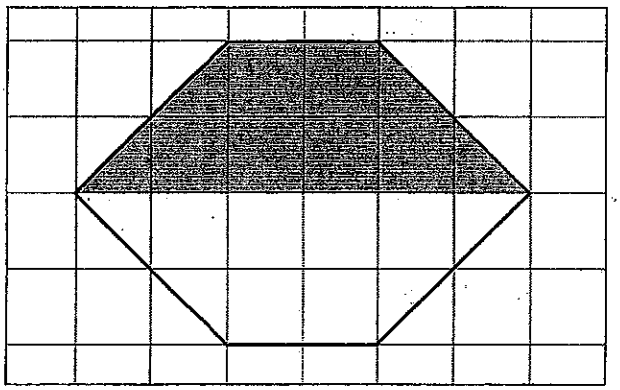
In how many different ways can you show a given fraction of a region?

Study each figure. See how the shaded part represents the fraction. Then copy the figure onto grid paper. Show as many other ways as you can to shade that same fractional part.

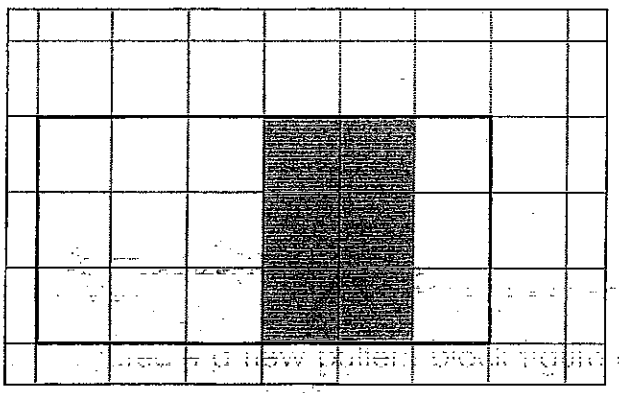
1. The shaded part shows one-half.



2. The shaded part shows one-half.

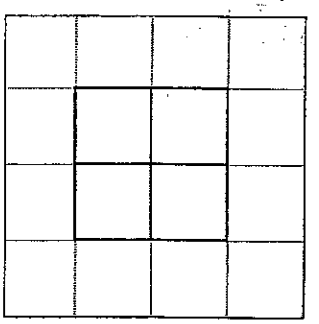


3. The shaded part shows one-third.



BRAIN TICKLER

The square below is made up of four small squares. Shade half of it so that the unshaded part is also a square.



Stand Up for Fractions

How can fractions help you describe what your class is wearing today?

GOAL: Students apply their understanding of the concept of fractions of a set to describe features of a group.

MATERIALS: only your students and their clothing!

The Plan

1. Record the number of students in class today—boys + girls. Ask, "What fraction of the class is the number of girls? What fraction are boys?" Explain that the total number of students in class is an example of a set, as are the number of boys and girls. Remind students that fractions can be used to describe features of a set. Point out that today they will be describing clothing as the specific feature of sets.

2. List different ways students might identify or categorize the clothing they wear to school. Guide them to suggest a variety of descriptions, from basic categories, such as sweater, skirt, dress, pants, or shoes, to more specific ones, such as long-sleeved top, button-front shirt, T-shirt with writing, jeans that are not blue, sneakers without laces, and so on.

3. Using the list students create, ask all who are wearing one kind of clothing to stand. For instance, say, "If you are wearing a shirt that buttons down the front, please stand." Have a volunteer count the students on their feet and then use a fraction to identify this standing group. For example, if 7 students are wearing button-down shirts and there are 19 students in the class, the fraction $\frac{7}{19}$ identifies the standing group. The numerator is the number of students wearing button-down shirts and the denominator is the total number of students in the class. If it is appropriate for your class, encourage students to express all fractions in simplest form. Have a volunteer record the fractions next to the clothing categories listed.

4. Repeat this procedure for the different garments students listed. Extend the task to include questions like "What fraction of all students is the set of girls wearing jeans?"

5. When all the data has been gathered, have students analyze it. Have them form small groups to carefully examine the fractions together. Ask them to write a summary of the information gathered about what the class is wearing that day.

Follow-Up

- Have groups share and compare their fraction analyses.
- Have any five students stand where all can see them. Ask a volunteer to write one fraction that describes something about the clothing those students are wearing. Then challenge other students to identify the feature of the students' dress that the fraction describes. Repeat with other volunteers.

Class Fraction Wall

How can you use fractions to describe your class from one day to the next?

GOAL: Students create an ongoing bulletin board display that presents a profile of the class. The display describes classmates' interests and preferences.

MATERIALS: posterboard, markers

The Plan

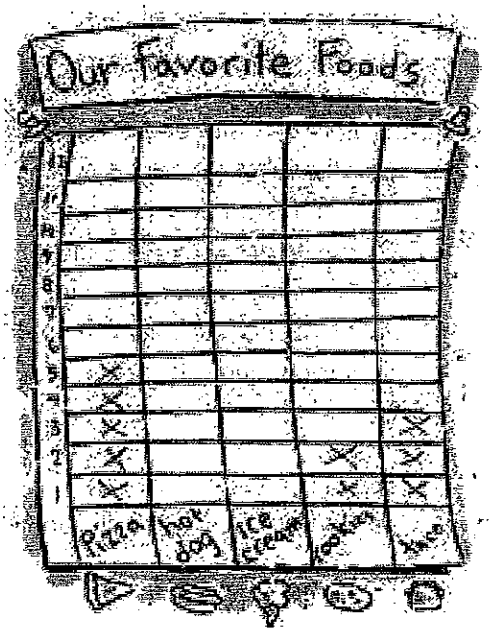
1. Explain to students that fractions can be used to create a profile of the class. Use the example of favorite foods. Generate a list of five foods the class enjoys. Record how many students prefer each of the foods. Then guide them to use fractions to express those preferences. For example, if 5 students name pizza as their favorite food, and there are 21 students in the class, the fraction $\frac{5}{21}$ represents that information: The numerator is the number of students who expressed a particular preference; the denominator is the total number of students in the class.

2. As needed, review how to use tally marks to record responses in a survey.

3. Divide the class into groups, assigning each a different topic generated by whole-class discussion. Examples might include favorite sports, ice cream flavors, TV characters, ways to spend free time, authors, or seasons.

4. Provide each group with posterboard and markers. Have each group conduct a survey of their class in which students choose the item they most prefer from a list of choices the group generates and presents. Tasks include developing the list of choices, polling all students, tallying responses, making a chart based on the results, and describing the process.

5. Invite groups to post their charts on the bulletin board. Use the data to formulate questions that students can answer with a fraction.



Follow-Up

- Repeat and revise this class profile activity as an ongoing, ever-changing investigation. Change topics, student groupings, and ways to use fractions to interpret results. For example, students can compare results to one-half, to one another, and to results from earlier surveys or from those done in other classes.
- Challenge students to create computer-generated charts or tables to represent the data they have gathered. Compare and contrast different types of graphic organizers.

Picture These Fractions

How can fractions help you describe what you see in pictures?

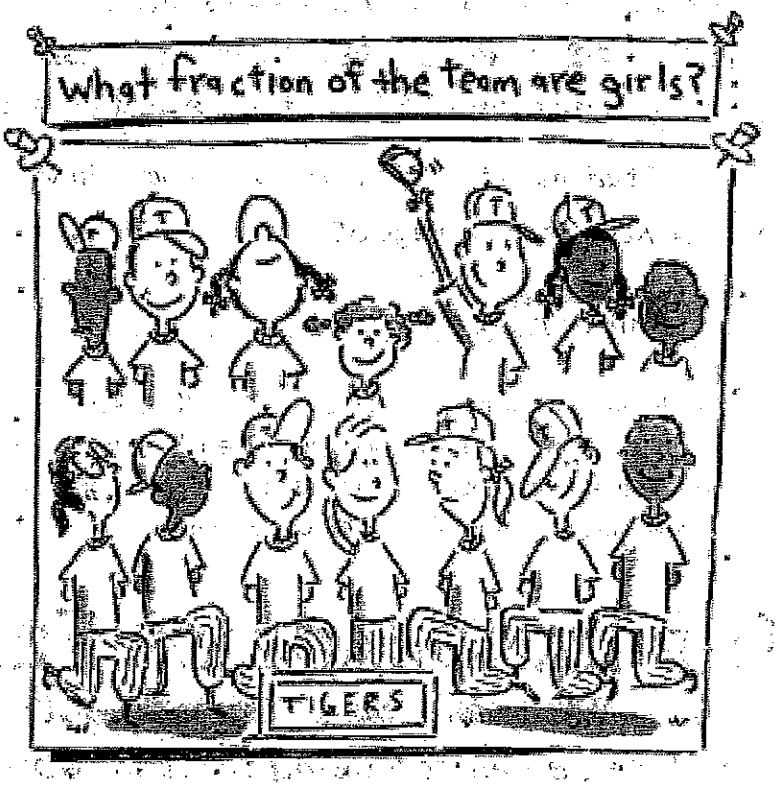
GOAL: Students create a display of pictures or photos of groups. They use fractions to describe what the pictures show.

MATERIALS: old magazines or newspapers; loose photos of groups of people, animals, or various items; scissors; tacks or staples

The Plan

1. Create a bulletin board display consisting of group photos. Post pictures of groups of people or animals, or of discrete objects that can be counted, such as bunches of assorted flowers, bowls of fruit, books on shelves or scattered on tabletops, or various toys or gadgets in store window displays.

2. Post a set of questions about the pictures that students can answer using fractions. For example, for a photo of fans at a ball game you might ask, "What fraction of the fans are children? What fraction of the fans are wearing sunglasses? What fraction are seated?"



3. Keep updating the bulletin board display. Change the photos frequently, along with the questions that accompany them. Involve students in the creation of the display by inviting them to bring in their own photos or to find some in the periodicals you provide. Have them post fraction questions with their group photos for classmates to answer.

Follow-Up

- Play a guessing game to extend the lesson. Form small groups. One member secretly chooses one of the photos on display and describes some feature of that photo using fractions. For example, "Half the boys in one photo are wearing baseball caps. Which photo am I describing?" The other students use the clue to identify the photo. Students can swap roles.
- If you have access to digital photography, use the editing features to generate variations on class photos to reinforce the concept of fractions of a set.

Mixing Snack Mix

Try a hands-on approach to fractions of a set.

GOAL: Students use counters to create "snack mixes" that satisfy fraction rules.

MATERIALS: 18 counters (or other small objects) in each of 3 colors, student page 29

TEACHING TIPS

⊛ Provide each student or pair with counters or other small objects with which to work out these fraction challenges. If you wish to provide actual raisins, nuts, and chocolate chips, be sure that students wash their hands first and that they don't eat the spoils until the end!

Fraction Message

Identify fractions of a set to answer a geography question.

GOAL: Students identify fractions of a set—in this case, particular letters within a word.

MATERIALS: student page 30

TEACHING TIPS

⊛ Duplicate and distribute copies of page 30 to each student or pair. Explain that students must correctly identify the fractional part of each word and write the correct letter in the space to its right. When they have found all the letters, they can copy them in order at the bottom of the page to answer the question about the Potato Museum.

The Language of Fractions

Complete sentences using fraction words.

GOAL: Students apply their understanding of fraction concepts in order to complete sentences.

MATERIALS: student page 31

TEACHING TIPS

⊛ Duplicate and distribute copies of page 31 to each student. Explain that each word in the box will be used only once. Invite students to develop variations of this page for classmates.

Name_____ Date_____

Mixing Snack Mix

Try to make a snack mix according to fraction rules!

You will need 18 counters of one color, 18 of a second color, and 18 of a third color. Put them in groups (or cups) on your desk.

- Let one set of counters stand for raisins.
- Let the second set stand for nuts.
- Let the third set stand for chocolate chips.

Use counters to make different snack mixes according to the rules given. Record how many of each "food" is in your mix.

1. Make an 18-piece snack mix with raisins and nuts. Use half as many nuts as raisins. _____

2. Make a 24-piece snack mix with nuts and chocolate chips. Use one-third as many chips as nuts. _____

3. Make a 36-piece snack mix with raisins, nuts, and chocolate chips. Use the same number of each food. _____

4. You want to make a 48-piece snack mix using all three snacks. You want to use all the nuts and half as many raisins as nuts. Are there enough chocolate chips for this mix? Explain.

_____

5. Jorge made a snack mix with 16 chocolate chips, 12 raisins, and 4 nuts. Use fractions in all the ways you can to describe Jorge's mix.

_____

_____

6. Create your own sets of rules for making a snack mix. Write down your rules. Give them to classmates to use.

PREPARE TO SHARE

What was tricky about this task? Explain.

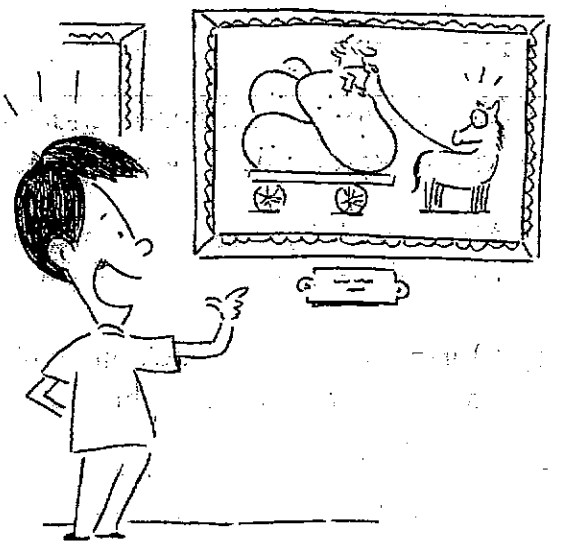
Name_____ Date_____

Fraction Message

Peel yourself away from the other attractions in this city so you can enjoy its Potato Museum. What is the name of this city that takes its spuds so seriously?

To find out, identify the fraction of each word. Write the letters in order on the lines below. The first one has been done for you.

1. the first $\frac{1}{3}$ of ANT ___A___
2. the last $\frac{1}{4}$ of GIRL _____
3. the second $\frac{1}{5}$ of ABOUT _____
4. the second $\frac{1}{4}$ of QUIT _____
5. the middle $\frac{1}{5}$ of PIQUE _____
6. the first half of UP _____
7. the middle $\frac{1}{5}$ of BREAK _____
8. the second $\frac{1}{5}$ of PROVE _____
9. the second fourth of AQUA _____
10. the fourth fifth of ABOUT _____
11. the second fifth of READY _____
12. the second half of IN _____
13. the final fourth of PINE _____
14. the last $\frac{1}{4}$ of FLEW _____
15. the middle third of AMP _____
16. the last sixth of PUDDLE _____
17. the last third of TAX _____
18. the second fourth of DIET _____
19. the first $\frac{1}{6}$ of CHROME _____
20. the third fifth of GROOM _____



PREPARE TO SHARE

The Potato Museum is in _____

Name _____ Date _____

THE LANGUAGE OF FRACTIONS

Here are some words about fractions.

Use the word from the box that best completes each sentence.

half	quarter	eighth	denominator
third	fifth	tenth	equivalent
fourth	sixth	numerator	improper

1. The number above the bar in a fraction is the one you say first. This number is called the _____.
2. One of five equal parts is known as a _____.
3. One of six equal parts of something is a _____.
4. One _____ is the same as one-fourth of a dollar.
5. A fraction is said to be _____ when its numerator is greater than its denominator.
6. Either of two equal parts of a figure is _____.
7. Two fractions are _____ if they name the same amount.
8. In a fraction, the _____ tells the total number of parts.
9. One-_____ is less than one-sixth but greater than one-ninth.
10. A year is one-_____ of a decade.
11. One-_____ is greater than one-fourth but less then one-half.
12. Each side of a square is one-_____ of the distance around the square.

WRITE ABOUT IT

Look around the room for things you could describe using fraction words. Then write five sentences about what you see. In each sentence, use a different word from the box. Underline the word you chose. Example: The window is open about one-fifth of the way.

Fraction Dictation

Can you write fractions and mixed numbers that you hear spoken aloud?

GOAL: Students write the numerical representation of a fraction or mixed number when they hear it spoken.

MATERIALS: none

The Plan

1. Begin by discussing with students the importance of knowing the correct way to write a fraction or mixed number. Reiterate that most fraction word names end with *-ths*, with the exception of *halves* and *thirds*.

2. Read aloud sentences containing fractions or mixed numbers. Alternatively, have students form pairs or small groups and give sentences to a member of the group to read aloud to the others.

3. When students hear the sentences, they write in numerical form the fraction or mixed number they hear. Try several practice sentences so that students grasp the task.

4. Use these sentences or others like them:
   - More than **one-half** of the world's population lives in Asia.
   - **Two-sevenths** of the days of the week begin with *T*.
   - Each week in February is **one-fourth** of the month, except during leap years.
   - The value of a quarter is **two and one-half** times the value of a dime.
   - A basketball season can last about eight months, or **two-thirds** of a year.
   - In the American Football Conference, **two and one-fifth** times as many teams do not make the playoffs as do make them.
   - The Thanksgiving Tower in Dallas has **five-sixths** as many floors as the city's Bank One Center does.
   - **One-third** of a healthy diet comes from fruits and vegetables.
   - I ran **seven-eighths** of a mile in five minutes.
   - **Eleven-twelfths** of the months have at least 30 days.
   - Each day, on average, the *Wall Street Journal* sells about **four and one-fourth** as many newspapers as the *Newark Star-Ledger* does.
   - **Ninety-eight-one-hundredths** of all American homes have at least one television.

Follow-Up

- Invite students to make up their own sentences containing fractions. Have them say these aloud to a partner, who must then write the fraction correctly.

Fractions and Egg Cartons

How can an empty egg carton model the idea of equivalent fractions?

GOAL: Students use egg cartons to get hands-on experience with equivalent fractions.

MATERIALS: empty egg cartons, beans or counters, pipe cleaners or yarn (optional)

The Plan

1. Distribute empty egg cartons to pairs of students. Point out that each carton represents one whole. Elicit from students what fraction each cup in the carton represents. ($\frac{1}{12}$)

2. Ask students to use the egg carton to model different fractions. For example, have them place beans, one per cup, to show $\frac{1}{12}$, $\frac{5}{12}$, and $\frac{11}{12}$. Ask them to tell how many beans they need to show each fraction they make. Ask them to tell how many beans they would need to model the fraction $\frac{12}{12}$. (*12*)

3. Have pairs of students place beans, one per cup, in their carton to model a carton half-filled. They may place one bean in each cup in any order to show one-half. Ask, "Count your beans. How many beans have you used to show one-half?" (*6*) Then ask, "Does it matter where you place the beans?" (*no*) "How many twelfths make one-half?" ($\frac{6}{12}$)

4. In the same manner that you guided students to see that $\frac{6}{12}$ is equivalent to $\frac{1}{2}$, guide pairs to place beans in their cartons to model the equivalence of $\frac{4}{12}$ and $\frac{1}{3}$. Then repeat for $\frac{3}{12}$ and $\frac{1}{4}$, and for $\frac{2}{12}$ and $\frac{1}{6}$. Each time, have students explain what they did to model the fraction. Be sure pairs empty their cartons before modeling each new equivalence. If appropriate, guide students to establish the number of cups in three equal groups, four equal groups, and six equal groups. This will help them model each fraction equivalence.

5. Have students use the beans to fill two-thirds of the carton. Before they begin, invite them to speculate about how many beans this will take and ask them to give their reasoning. Then ask, "How many twelfths make two-thirds? How do you know?" ($\frac{8}{12}$)

6. Repeat this procedure for the fractions $\frac{3}{4}$ and $\frac{5}{6}$.

7. Ask students to summarize what they have learned about fractions in this activity. Challenge them to think of another hands-on way to explore the same idea.

Follow-Up

- Instead of using beans or counters, have students use pipe cleaners or yarn to show fractions of the egg carton (as a region). For example, to show half, they can wrap the pipe cleaner around the middle of the carton, separating it into two sets of six cups.
- To explore mixed numbers, such as $1\frac{1}{4}$, pairs can use two or more egg cartons to conduct similar hands-on modeling.

BADGE BUDDIES

How do you know which fraction badge is a match for yours?

GOAL: Students play a game in which they find equivalent fractions.

MATERIALS: large index cards, pieces of oaktag, or construction paper; string or yarn; staples; shopping bags

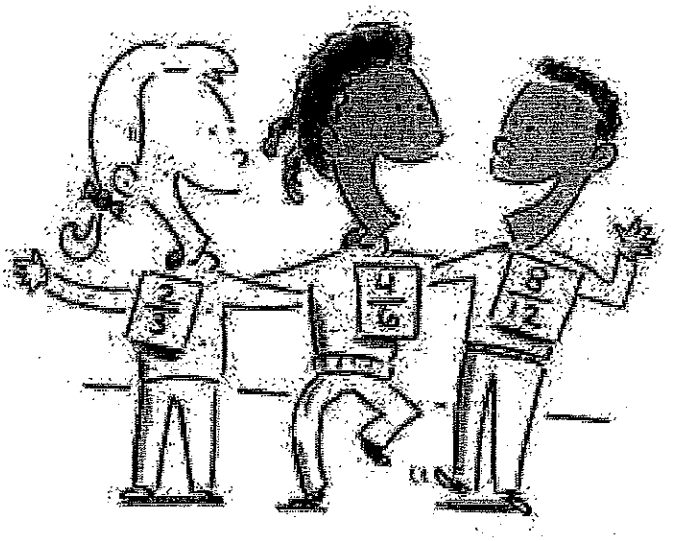
THE PLAN

1. Make sets of fraction badges using the index cards, oaktag, or construction paper. Each set should consist of at least three equivalent fractions, such as $\frac{1}{3}$, $\frac{2}{6}$, and $\frac{3}{9}$. Prepare enough sets to allow one badge per student. Staple string or yarn to each badge so that students can wear them around their necks, hanging loosely across the chest.

2. Mix up the badges and place them in a shopping bag. Then have students reach in, take a badge, and put it on.

3. Give students three minutes to find their badge buddies—all other classmates whose badges display a fraction equivalent to the one the student is wearing.

4. Invite students to call out to each other during the buddy search, as they look for specific fractions they know belong in their group. Groups stand or sit together when they are complete.



5. Have students return their badges to the badge bag after a round. Then play again.

FOLLOW-UP

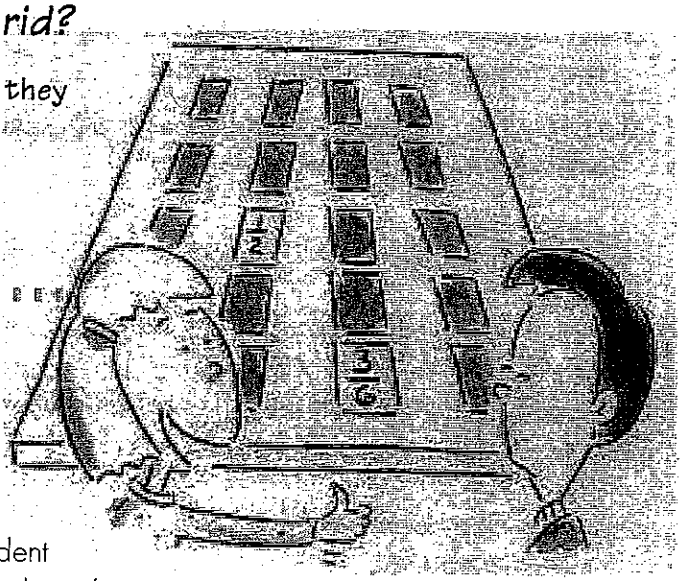
- Play the matching game to reinforce the concept of fractions in simplest form. When you do this, make sure that one fraction in each set is expressed in lowest terms. When students have found their badge buddies, ask them to indicate the student who is wearing the badge with the fraction in simplest form.
- Include fractional numbers greater than one. Make sets of equivalent mixed numbers and improper fractions, such as $\frac{13}{4}$, $\frac{14}{8}$, and $\frac{19}{12}$, and include them in the badge bag.

EQUIVALENT FRACTION CONCENTRATION

Can you spot equivalent fractions when you see them?
Can you recall where they are on a grid?

GOAL: Students play a familiar game in which they seek to match equivalent fractions.

MATERIALS: index cards



THE PLAN

1. Tell students that they are going to play Equivalent Fraction Concentration. Have them help you make the playing decks, each of which will have 20 pairs of equivalent fraction cards. Divide the class into groups of four and have each group make a deck of cards. Each student should write a different fraction on each of five cards and then write the equivalent of each one on another five cards.

2. Instruct students to shuffle their decks of 40 index cards and then turn them all facedown on the table in an 8 x 5 array.

3. Present these rules:
   - Establish an order of play.
   - Taking turns, each player flips two cards faceup. If the cards display two equivalent fractions, it is considered a match. The player removes those cards from the table and takes another turn.
   - If the cards do not match, the player turns them facedown in their original positions and the next player takes a turn.
   - The winner is the player who has collected the greatest number of cards once all matches have been made.

4. Have groups play several times, making sure to shuffle the decks well after each game.

FOLLOW-UP

- Have students play with decks made by other groups.
- Increase or decrease the number of sets in each deck.
- Extend the game by including decimals and/or money amounts equivalent to fractions in the decks—for example, sets such as 0.5 and $\frac{1}{2}$, \$.80 and $\frac{4}{5}$.
- Extend the game by including mixed numbers and their equivalent improper fractions in the decks.

Fractions Bingo—Times Two

How well can you match equivalent fractions or round mixed numbers?

Goal: Students practice matching equivalent fractions, or mixed numbers and improper fractions, using a Bingo format.

Materials: student pages 37 and 38, counters, 1–6 number cubes (2 per group, p. 85), 1–8 spinner (1 per group, p. 90)

The Plan — Equivalent Fractions Bingo

1. Have students form groups of four, and review the basic rules for Bingo. Tell groups that one member in the group will be the caller. Then duplicate and distribute the Equivalent Fractions Bingo student page. Provide each group with two 1–6 number cubes and a stack of counters with which to cover squares on their cards.

2. Review the directions on the student page. Guide students as they fill in their grids. Then present the rules for playing:
   - The caller rolls the two number cubes and calls out the fraction created. The smaller number is the numerator and the greater one is the denominator.
   - Players scan their cards for a fraction equivalent to the fraction called. If they find an equivalent fraction, they cover its space with a counter.
   - The first player to cover a row, a column, or a diagonal on his or her card wins. The winner becomes the caller for the next round of Bingo.

The Plan — Rounding Mixed Numbers Bingo

1. Duplicate and distribute the Rounding Mixed Numbers Bingo student page. For this game, each group needs a spinner as well as two number cubes. Then present the following game rules for rounding mixed numbers: Compare the fraction part to $\frac{1}{2}$. If it is less than $\frac{1}{2}$, round down. If it is greater than or equal to $\frac{1}{2}$, round up.

2. Present the rules for this version of the game:
   - The caller spins the spinner and rolls the two number cubes. The number indicated on the spinner is the whole-number part of the mixed number. The smaller number rolled is the numerator of the fraction part, and the greater number rolled is the denominator. For example, if the caller spins a 3 and rolls a 1 and a 5, the mixed number would be $3\frac{1}{5}$. Have the caller write down the number.
   - Players round the mixed number to the nearest whole number, and then scan their cards to find that number. If they find the number, they cover its space.
   - The first player to cover a row, a column, or a diagonal on his or her card wins. The winner becomes the caller for the next round.

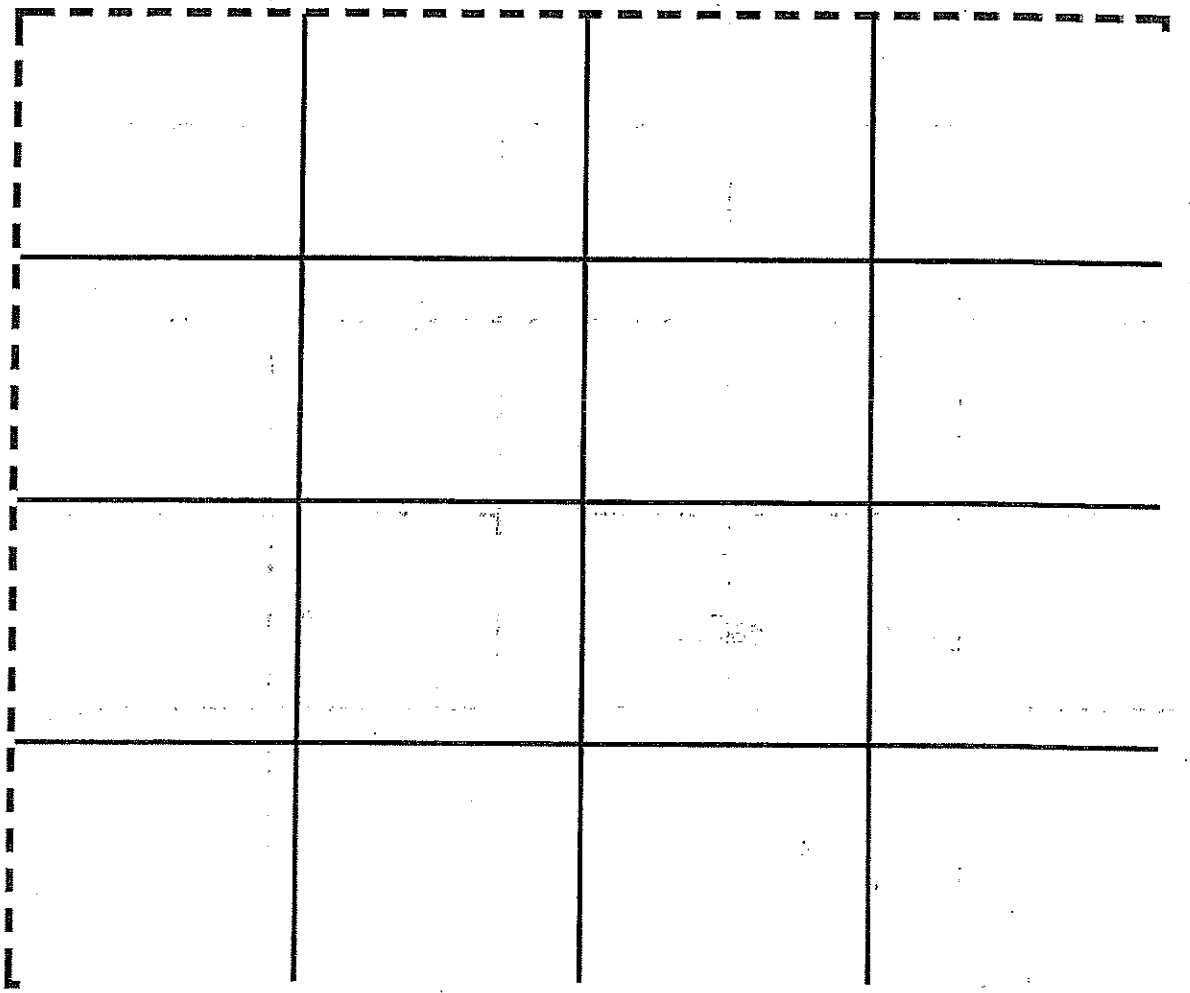
Name _____ Date _____

EQUIVALENT FRACTIONS BINGO

Choose 16 of the fractions from the box below. Write one fraction in each square of your Bingo card. You may use any fraction one or two times, but not more than that. Write the fractions in any squares you wish.

$\frac{2}{12}$	$\frac{2}{10}$	$\frac{3}{15}$	$\frac{2}{8}$	$\frac{3}{12}$	$\frac{3}{9}$	$\frac{5}{15}$	$\frac{5}{10}$	$\frac{7}{14}$	$\frac{4}{10}$	$\frac{6}{15}$
$\frac{6}{10}$	$\frac{9}{15}$	$\frac{6}{9}$	$\frac{8}{12}$	$\frac{6}{8}$	$\frac{9}{12}$	$\frac{8}{10}$	$\frac{12}{15}$	$\frac{10}{12}$	$\frac{15}{18}$	

My Fractions Bingo Card



PREPARE TO SHARE

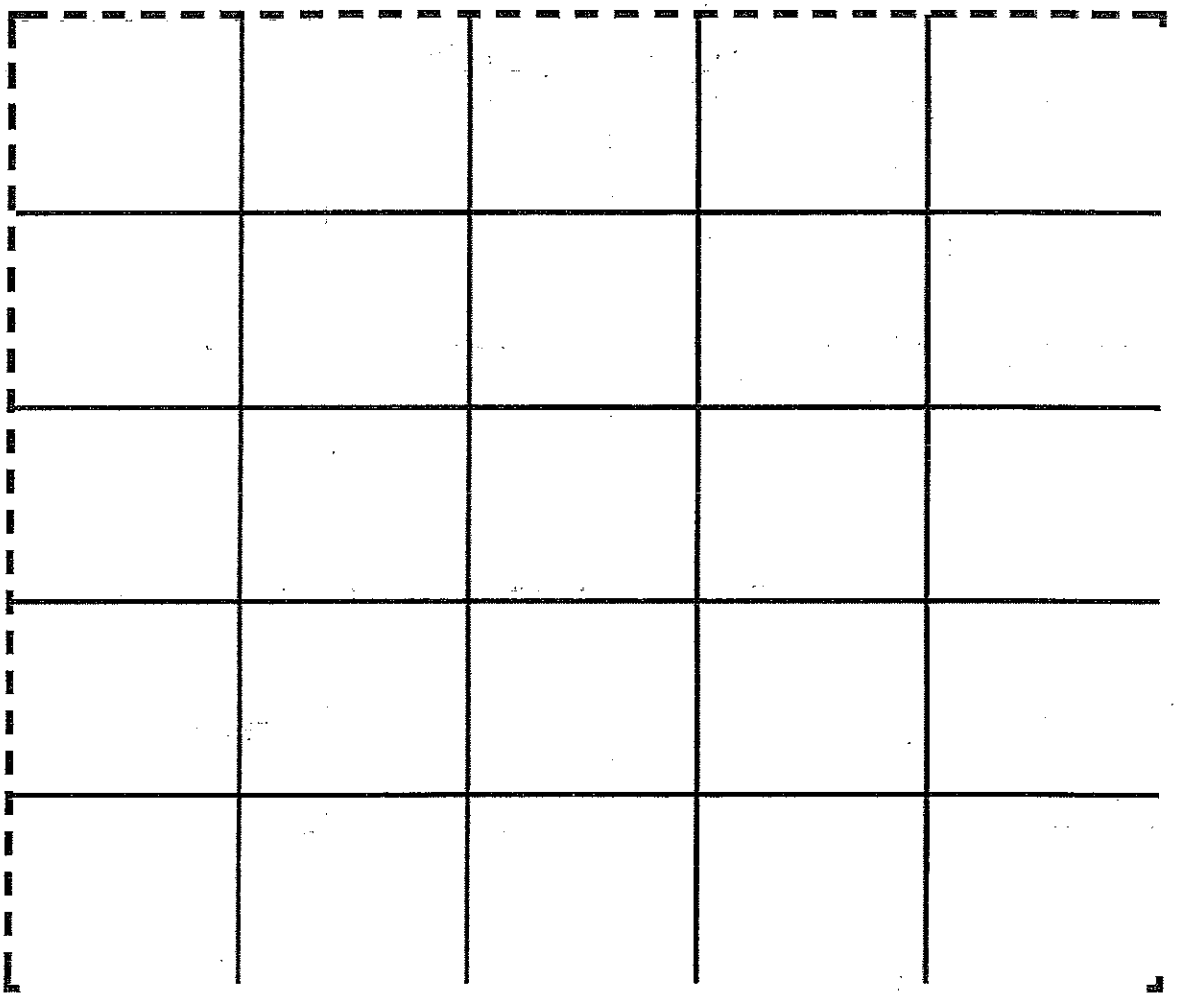
How would you vary the way you fill your card for future games? Explain.

Name _____ Date _____

Rounding Mixed Numbers Bingo

Write one number from 1 to 9 in each square of your Bingo card. You may use each number one, two, or three times, but not more than that. You may place the numbers in any squares you wish.

My Fractions Bingo Card



Prepare to Share

How might you fill out your card differently for future games? Explain.

Fraction Poems

How can these poems help you remember fraction rules?

GOAL: Students read, recite, and present poems to reinforce fraction concepts.

MATERIALS: student page 40, tape recorder or CD burner (optional)

The Plan

1. Duplicate and distribute copies of page 40. Invite students to read the poems silently to get the general idea of what each one means.

2. Discuss with students the concept or idea behind each poem. For example, the poem entitled "Half" addresses the mistaken idea that a person can get a "bigger half." By definition, *half* means either of two equal parts, so mathematically, there cannot be a bigger half. Work through a fraction exercise with the related poem on hand. Guide students to see how the words of the poem relate to the steps they follow.

3. Invite students to think of ways to present the poems. For example, they might chant them, set them to music, recite them over background rhythms, or arrange them for choral reading. Poems can be read or memorized, as you see fit.

Follow-Up

- Challenge students to create their own poems that address fraction concepts. Or invite them to add verses to the poems presented here.
- Extend this activity by producing a class fraction tape (or CD) that presents these poems along with those students have written.

Name_____ Date_____

Fraction Poems

Read these fraction poems. Think about what each one means.

Be Fair!

Be fair to your friend, the friendly fraction,
Reduce both terms fairly when you try.
Be fair to numerators and denominators,
'Cause you'd never want to make a fraction cry!

Be fair to both terms when you reduce them,
Reduce them equally to simplify.
Be fair to numerators and denominators,
'Cause you'd never want to make a fraction cry!

Half

You may think it's fun to laugh
When you get the bigger half.
But, my friend, the laugh's on you:
Half means equal parts in two.

Lowest Common Denominator

Lowest common denominator,
What does that mean to me?
Lowest common denominator,
It's the good old LCD.

Wanna add or subtract two fractions?
It's easy if you play the game.
To add or subtract two fractions,
The denominators must be the same.

So how do you get two fractions
To be in synch for you?
Find the lowest common denominator,
And make the switcheroo.

GCF

Simplest form, simplest form,
How on earth will you transform
A fraction with greater terms to be
Of equivalent value, and easy to see?

GCF, GCF,
Greatest common factor, that's what's left.
Put fractions on a diet with a GCF,
Reduce those terms with a GCF.

Sharing Fraction Pie

How can you use clay pies to compare fractions?

GOAL: Students create, cut, and serve clay "pies" to explore comparing fractions.

MATERIALS: modeling clay, pencils (or dowels) for rolling pins, same-sized plastic lids for pie plates (from yogurt cups, margarine tubs, coffee cans, and so on), plastic knives, paper plates

The Plan

1. Divide the class into pairs or small groups. Provide each group with modeling clay, pencils or dowels, same-sized plastic lids, plastic knives, and paper plates. Tell students that they are going to make clay "pies" to cut into fractional parts and then compare the sizes of the parts.

2. Have children roll out the clay "pie dough" to fill the plastic lid. Then have them use the plastic knives to cut the pie in half and serve $\frac{1}{2}$ on a paper plate. Ask another member of the group to cut his or her pie into fourths and serve $\frac{1}{4}$ on the same plate. Ask: "Which is greater, $\frac{1}{2}$ or $\frac{1}{4}$? How do you know?" Record the answer on the chalkboard, using the mathematical symbol for *greater than* (>). ($\frac{1}{2} > \frac{1}{4}$)

3. Repeat this process with other fractional parts students can cut from their clay pies. Remind them to reroll the dough to begin with a whole pie each time. Generate a list of fraction comparison statements, such as $\frac{1}{3} > \frac{1}{6}$, $\frac{2}{3} > \frac{1}{2}$, $\frac{3}{4} > \frac{3}{5}$, that derive from students' explorations.

Follow-Up

- Extend by having students make, slice, and serve clay pie slices to form fraction comparison statements that use the *less than* symbol (<). For instance, $\frac{1}{2} < \frac{3}{4}$.
- Challenge students to compare halves of pies of different sizes to reinforce the concept that halves of same-sized regions are always equal, but halves of different-sized regions may well vary in size from one another.

Fraction Fill 'Em Up

Why does a fraction with a larger denominator represent a smaller part of the whole if the numerators are the same?

GOAL: Students do a hands-on exploration to compare fractions with unlike denominators.

MATERIALS: sets of four glass jars, masking tape, markers, pitchers, water, food coloring, paper towels

The Plan

1. Gather sets of four same-size glass jars, like mayonnaise, baby food, or peanut butter jars, for each group of 3–4 students. For each set, measure and mark off one jar each with masking tape to show halves, thirds, fourths, and fifths.

2. Divide the class into groups. Provide each group with a set of jars, a pitcher filled with colored water, and paper towels in case of spills.

3. Instruct groups to pour from the pitcher to fill each jar as follows:
   - Fill the jar marked in halves to $\frac{1}{2}$.
   - Fill the jar marked in thirds to $\frac{1}{3}$.
   - Fill the jar marked in fourths to $\frac{1}{4}$.
   - Fill the jar marked in fifths to $\frac{1}{5}$.

4. Have students compare the amount of liquid each jar holds, two jars at a time: Compare the halves jar with the thirds jar, the thirds jar with the fourths jar, and the fourths jar with the fifths jar. Ask students to explain what they notice.

5. Have students compare all four jars by placing them in order from least to most full. Again, ask them to describe what they notice.

6. Have students empty the water from the jars into the pitcher. Now have them refill the jars. This time, they should fill $\frac{2}{2}$ of the halves jar, $\frac{2}{3}$ of the thirds jar, $\frac{2}{4}$ of the fourths jar, and $\frac{2}{5}$ of the fifths jar. Before they pour, ask them to predict which jar will have the most liquid in it and which will have the least. Have students compare jars two at a time and order them from least to most filled-up.

7. Finally, ask students to summarize what they have observed about the sizes of fractions when the numerators (parts being considered) are the same but the denominators (total number of parts) differ.

Follow-Up

- Extend by having students use the jars to compare various fractions. For example, they can fill the jars to see that $\frac{2}{5} > \frac{1}{3}$ but $< \frac{1}{2}$ or that $\frac{3}{4} > \frac{1}{2}$ but $< \frac{4}{5}$.
- Extend by having students use calibrated measuring cups to perform similar comparisons using sand, water, or rice.

PROVE IT!

How can you prove that one fraction is greater than another?

GOAL: Students use models, drawings, oral arguments, and demonstrations to "present a case" for the inequality (or equality) of two given fractions.

MATERIALS: counters, containers, fraction strips (p. 84), rulers, pattern blocks (p. 86), paper and pencil, grid paper (p. 88 and 89), index cards

THE PLAN

1. Explain to students that in legal trials, lawyers make opening statements, present evidence, and then offer logical conclusions in their closing arguments. Tell students that they will pretend to be math lawyers.

2. Divide the class into groups of 4–6 lawyers, each headed by lead counsel. Tell groups that their assignment is to use the elements of a trial and all the resources available to them in the classroom to present a full case before a jury of peers (their classmates) to prove the inequality or equality of a pair of fractions.

3. Provide each legal team with an index card on which you have written a fraction statement to prove. Choose from the following statements, or provide others like them: $\frac{1}{3} > \frac{1}{6}$, $\frac{2}{9} < \frac{5}{9}$, $\frac{3}{4} < \frac{11}{12}$, and $\frac{1}{4} = \frac{2}{8}$. Challenge groups to work cooperatively, employing a variety of tools and strategies, to prepare a case to present to the class. Guide them to make their cases as clear, logical, and thorough as possible.

4. Allow groups time to develop their case and to plan strong opening and closing statements. Encourage groups to plan carefully the order of evidence to be presented and to involve all members in the presentation. Then have them present their case to the class. You may wish to videotape group presentations for future use as teaching tools.

FOLLOW-UP

- Allow time for students to comment on the effectiveness of groups' cases. Invite them to argue why the presentations were or were not convincing and to comment on what elements of the cases were most (and least) effective.
- Extend group assignments to include inequality statements involving mixed numbers and improper fractions or fractions and decimals.

Fraction War

How can playing a game reinforce your ability to compare fractions?

GOAL: Students play a card game in which they create and then compare fractions.

MATERIALS: sets of 24 index cards (two sets numbered 1 to 12)

The Plan

1. This is the first of three games in which students compare or order fractions. Play is based on the classic card game War, with which your students are no doubt familiar. Players do not manipulate their cards; they simply compare the two fractions formed by overturned cards.

2. Have students form pairs. Provide each pair with a deck of 24 cards. To play, students shuffle their deck of cards and deal them so that each player gets 12 cards facedown in a stack.

3. To begin, each player turns over the top two cards from his or her stack. Players arrange the two cards to form a fraction, with the greater number as the denominator. Players then compare the fractions that have been formed. The player with the greater fraction wins. That player then takes all four cards and places them at the bottom of his or her stack.

4. If the two fractions are equivalent, then neither player wins the cards. Those cards remain on the table as each player turns over two more cards and again builds a fraction. The player with the greater fraction now collects all eight cards on the table for his or her stack. Just like in the game of War, the player who collects all the cards wins.

5. At the conclusion of this activity, invite students to give their opinions of the rules of play. Invite suggestions about how to improve the game.

Follow-Up

- Have students make up their own decks for Fraction War. Invite them to use more or fewer than 24 cards and any whole numbers they choose.
- Vary the rules so that the player with the lesser fraction wins. Or vary the game to include three players; the winner can be the player with the greatest (or least) fractional number. If there is a tie between two players, only those two turn over another pair of cards, make new fractions, and compare again.
- For a more challenging game of Fraction War, create a deck of cards that consists of fractions and decimals. There should be an equal number of each form of number, and the values should be equivalent. For example, a deck with $\frac{1}{2}$, $\frac{3}{5}$, and $\frac{7}{8}$ would also have 0.5, 0.6, and 0.875.

Fraction Rollers, Part 1

Given two digits, can you make the greatest fraction? The least fraction?

GOAL: Students play a game in which they create and compare large and small fractions.

MATERIALS: 1–6 number cubes (p. 85), index cards

The Plan

1. Have students form pairs. Provide each pair with two number cubes. Tell students that they will play a game in which they create fractions with a roll of the number cubes.

2. Present the rules for play:
   - Each player rolls the number cubes to get two digits.
   - The player uses those digits to write the greatest possible fraction the digits can make. (This will always be a whole or mixed number.)
   - The player with the greater number wins a point; no points are given for a tie.
   - The first player to reach 10 points wins.

3. Have pairs play several times to provide adequate practice and to sharpen their understanding of the strategy of the game.

4. Vary the rules so that players try to form the *least* possible fraction using the two digits rolled. In this variation, the winner each time is the player with the smaller fraction. Or vary the game to include three players; in this case, the winner can be the player with the greatest (or least) fractional number or the one with the number in the middle.

5. For a more challenging game, have players use three number cubes to build their numbers in any fashion they wish. For instance, a roll of 1, 3, and 6 can be interpreted not only as a mixed number such as $1\frac{3}{6}$, $3\frac{1}{6}$, or $6\frac{1}{3}$, but also as $\frac{1}{36}$, $\frac{1}{63}$, $\frac{6}{13}$, and so on.

6. For whichever version of the game your students play, have them summarize the components of a winning strategy.

Follow-Up

- Have students make up their own comparing-fractions game in which they use cards, number cubes, spinners, or other manipulatives. Guide them to think through their games and test them before writing down the rules on index cards. Then have students teach their games to classmates. Invite them to demonstrate how to play.
- Invite students to contribute their ideas to a class book of fraction games.

That's an Order!

How well can you predict whether a fraction will be greater than, less than, or in between the value of two other fractions?

GOAL: Students play a fraction card game that helps them gain a solid understanding of how to compare and order fractions.

MATERIALS: sets of 48 index cards

The Plan

1. Prepare sets of 48 fraction cards, with halves, thirds, fourths, fifths, sixths, eighths, tenths, and twelfths in each set. The numerators can be any numbers that form fractions less than or equal to 1. Include $\frac{2}{2}$, $\frac{3}{3}$, $\frac{4}{4}$, and so on.

2. Tell students that they will play a game in which they must put fractions in size order. Have students form groups of four. Provide each group with a set of fraction cards. Tell them that in each game, three players play and the fourth is the dealer and judge. (These roles can shift.)

3. Present the rules for play:
   - The dealer shuffles the deck, then deals each player two fraction cards faceup and a third card facedown.
   - Players examine their faceup fraction cards and order them from lesser to greater. Then they decide whether the third card is likely to be less than both cards, greater than both cards, or greater than one card but less than the other. Each player states his or her prediction by saying "Greater," "Less," or "In between."
   - Then the dealer turns the third card faceup. Players each get 1 point if their prediction was correct.
   - The first player to earn 7 points wins.

4. Allow students to work with paper and pencil if they wish. Groups should play enough games so that each member gets a chance to play and to deal.

Follow-Up

- Encourage students to articulate a winning strategy for this game. Invite them to share pointers with classmates.
- Simplify the game to omit the prediction students must make, but leave the task of ordering fractions. In this variation, each player gets a point if and only if the third card has a value in between the other two.
- Extend the game by having the dealer deal all three cards at once. Players get 1 point if they correctly order their cards from least to greatest. Try this with four-card deals, too.

Fractions of a Day

How can fractions help you make a circle graph of how you spend a day?

GOAL: Students fill in a chart to show how they spend their day. Then they use the data in the chart to create a circle graph. They use fractions to interpret what the charts show.

MATERIALS: student pages 48–49, crayons

The Plan

1. Brainstorm with students a list of the main kinds of activities kids do every school day, almost every day, and on some days but not others. Then tell students that in this activity, they will estimate how much time they themselves actually spend on these activities, record that information in a table, and then display it on a circle graph.

2. Explain that a circle graph is a useful tool for showing how an amount of data is divided.

3. Duplicate and distribute the Fractions of a Day student pages and hand out crayons. First, go over how to complete the table on page 48. Guide students to begin by recording how much time they spend doing everyday activities of sleeping, attending school, and eating meals. Also talk about the idea of establishing average daily times for activities that vary in length from day to day. Remind students that the total time for all daily activities must add up to 24 hours.

4. Help students understand how to complete the circle graph on page 49. Guide them to notice the 24 divisions—one per hour of a day. Direct students to use a different color for each activity and to label it—either within its part of the circle or outside it, indicated with a line or arrow.

5. Have students use fractions to summarize the information on their graphs. For example, a student who sleeps 8 hours a day sleeps for $\frac{8}{24}$ of the day. If appropriate for your class, have students express their fractions in simplest form.

6. When students finish, help them post their graphs and summaries on a bulletin board. Invite volunteers to analyze the data on the graphs and to discuss similarities and differences among them.

Follow-Up

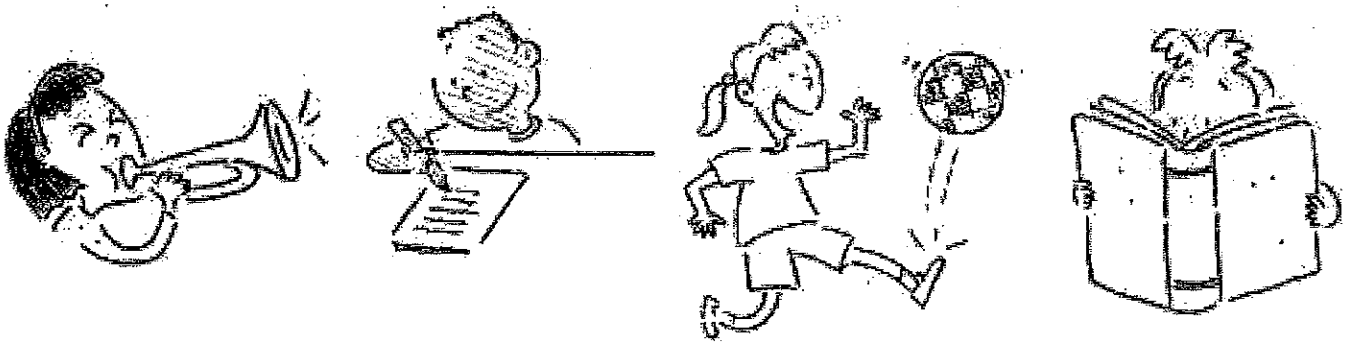
- Have students collaborate on a class graph of the same data.
- Invite students to make tables and graphs that show how they typically spend their time in school or on a weekend day. Help them generate a circle chart with the appropriate number of sectors for the graph they wish to display.

Name _____ Date _____

Fractions of a Day, Part 1

Fill in the chart with the activities you do on a typical school day. Assign each activity a different color. The total time for all activities must add up to 24 hours.

Activity	**Time Spent** (to nearest hour)	**Color**



Prepare to Share

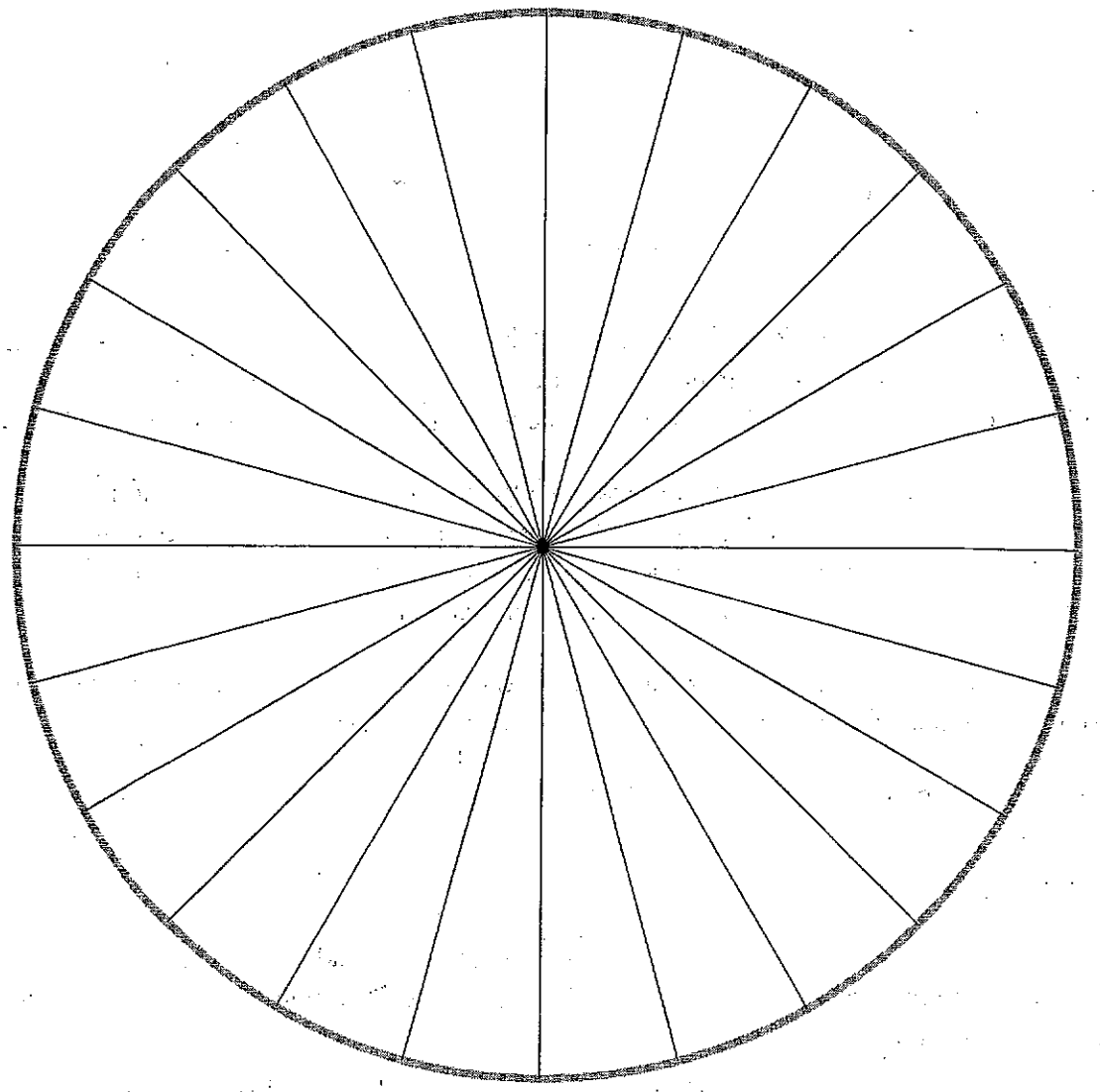
In what ways would this table look different if you filled it in for any given Saturday? Explain.

Name _____ Date _____

Fractions of a Day, Part 2

Use the information from the chart on page 48 to make a circle graph. Color a section of the circle graph to show how much time you spend doing each activity. Fill in each section with the color you chose for that activity. Label each section of the graph with the name of the activity and a fraction that describes the amount of time.

How I Spend My Day

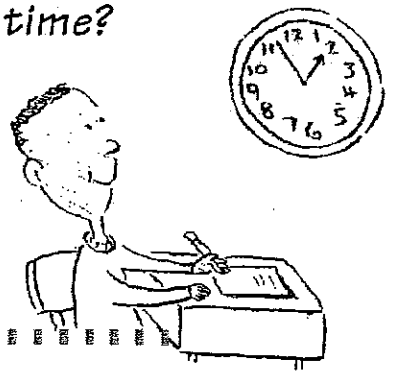


Prepare to Share

In what ways would this graph look different if you based it on how you might spend a day when you're sick? Explain on the back of this page.

TIME FOR FRACTIONS

How can you use fractions to express lengths of time?



GOAL: Students add amounts of time to reinforce the relationship between time and fractions (parts of an hour).

MATERIALS: sets of 20 index cards , play clocks or analog watches

THE PLAN

1. Make sets of 20 index cards (one set per group) for the following times:

$\frac{1}{6}$ hour	$\frac{1}{2}$ hour	10 minutes	40 minutes	sixth of an hour
$\frac{1}{5}$ hour	$\frac{2}{3}$ hour	15 minutes	45 minutes	quarter of an hour
$\frac{1}{4}$ hour	$\frac{3}{4}$ hour	20 minutes	48 minutes	thirty minutes
$\frac{1}{3}$ hour	$\frac{5}{6}$ hour	30 minutes	50 minutes	half an hour

2. Have students form groups of 3–4. Tell groups that they will play a game in which they record and use amounts of time, expressed in minutes or in fractions of an hour. Provide a play clock (such as a paper-plate clock) or analog watch that students can manipulate to show accumulated time.

3. To play, students shuffle their cards and place them facedown in a stack. They start their group's clock at 9:00 A.M. One player turns over the top card, reads aloud the amount of time it shows, and moves the hands of the clock or watch ahead to show the new time. Other group members verify that the clock hands are correctly positioned. The used card is returned to the bottom of the stack.

4. Play continues in turn, with each player drawing a card, reading the amount of time it shows, then moving the clock ahead to show the amount of time that has passed.

5. The player who is the one to draw a card that moves the clock to 3:00 P.M. or beyond wins.

FOLLOW-UP

- Conclude the activity by talking about the game. Discuss what was easiest and hardest about it. Discuss ways to change or improve the game. Are there cards that students would add to or remove from the set? Which ones?
- For an additional challenge, add cards to the sets—for example, more fifths as well as tenths and twelfths.
- Challenge students to compute backward from, for example, 6:00 P.M. to noon.
- Help students create a similar game using fractions of a year (as well as time given in days, weeks, and months), in which they move on a calendar from January to December.

COINING FRACTIONS

How can you express money amounts in fractional terms?

GOAL: Students use play money to represent parts of a dollar and to build an understanding of renaming improper fractions as mixed numbers.

MATERIALS: sets of paper coins (page 91) or play coins (5 pennies, 5 nickels, 5 dimes, and 5 quarters per set)

THE PLAN

1. Group students into pairs. Provide each pair with a set of coins.

2. Discuss the value of each coin as a fraction of a dollar. Guide students by asking questions, such as "What fraction of a dollar is a dime?" or "What fraction of a dollar is a quarter?" Then ask, "What fraction of a dollar is a quarter plus a dime?" or "What combination of the coins in your set makes the fraction $\frac{1}{5}$ of a dollar?" or "Which three coins add to make the fraction $\frac{27}{100}$ of a dollar?"

3. Give partners a few minutes to generate questions like these for each other. Guide them to manipulate the play coins to answer the questions they formulate.

4. Guide students to understand that a money amount over $1.00 can be interpreted as a mixed number. For example, $1.20 = 1 whole dollar and $\frac{20}{100}$ of a dollar, or $1\frac{20}{100}$, or $1\frac{1}{5}$.

5. Have one partner gather some of the coins and place them on the desktop, grouped by type. Ask that student to give the sum, in dollars and cents, of the coins chosen. The other partner then determines what fraction of a dollar is represented by each type of coin picked. For example, 2 quarters can be expressed as $\frac{2}{4}$ (or $\frac{1}{2}$) of a dollar. Then the same partner writes each fraction as an addend in an addition problem. For example, if the first student were to select 2 quarters, 3 dimes, 1 nickel, and 2 pennies (for a total of $.87), the second student would write: $\frac{2}{4} + \frac{3}{10} + \frac{1}{20} + \frac{2}{100}$. If appropriate, have students express each fraction in simplest form.

6. Have partners take turns collecting and grouping the coins and writing an addition problem for each set.

FOLLOW-UP

- Challenge the second partners to find the sum of the coins by adding the fractions. For example, for the problem given above, a student might write:

  $\frac{50}{100} + \frac{30}{100} + \frac{5}{100} + \frac{2}{100} = ? \left(\frac{87}{100}\right)$

- Have students each take two discrete bunches of coins. Have them use fractions to represent the two money amounts and then find their difference.

- Duplicate and distribute the following page, an activity that challenges students to further explore the relationship between fractions and money amounts.

Name _____ Date _____

FUNNY MONEY

You will need the coins shown in the above picture. Use them to solve these problems.

1. How many coins are there in the whole set? _____

2. One-half of the coins in this set have a value of 41¢.
   How many coins is this? _____
   Which coins are they? _____

3. One-quarter of the coins add up to 6¢. How many coins is this? _____
   Which coins are they? _____

4. Three-quarters of the coins make 63¢. How many coins is this? _____
   Which coins are they? _____

5. What is the least value that $\frac{1}{2}$ the coins can have? _____
   Which coins would be in this half of the set? _____

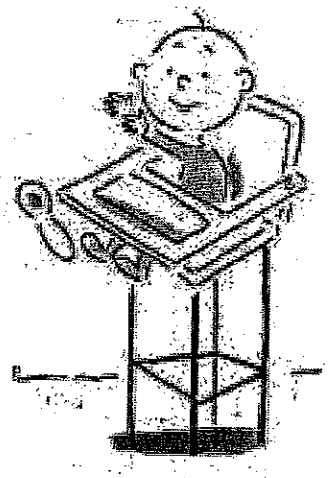
6. What is the greatest value that $\frac{1}{2}$ the coins can have? _____
   Which coins would be in this half of the set? _____

7. Kent knows that $\frac{1}{4}$ of a set is less than $\frac{1}{2}$ of that set. So he's sure that $\frac{1}{4}$ of the coins *can't* be worth more than $\frac{1}{2}$ of the same coins. But Kelly disagrees. Who is right? Prove it! Explain with a picture and a caption.

PREPARE TO SHARE

What did you find tricky about these problems? Explain on the back of this page.

Fractions and Ages



How can you use fractions to express ages?

GOAL: Students use fractions and/or mixed numbers to describe the ages of friends, family members, and pets.

MATERIALS: none

The Plan

1. Start this activity in class and have students complete it at home.

2. Begin by asking each member of the class to write down how old he or she is, in years and months (for example—10 years, 3 months). Guide students to round their age to the nearest year and month. Talk about ways to round. Then ask, "How old are you in years and fractions of a year?"

3. As needed, discuss how to name numbers of months as fractions of a year. You might give some examples to help students get started. For instance, write 9 years, 8 months on the chalkboard, and then elicit that this age translates to $9\frac{8}{12}$ years, or $9\frac{2}{3}$ years. Ask students how they would express 9 months, 3 months, 2 months, and so on, as fractions of a year. Then have students share their responses to your original question.

4. Assign students to gather the ages, in years and months, of friends, family members, neighbors, and pets, too! Have them record each age two ways in a table (like the one started below). Guide them to express all mixed numbers in simplest form.

Name of Person or Pet	Age in Years and Months	Age as a Mixed Number
Spot	3 years, 4 months	$3\frac{1}{3}$ years

5. Have students share their tables, as well as their experiences filling them in, in class the following day. Invite volunteers to post their charts.

Follow-Up

- Extend by having students use an almanac or other resource to find the ages of United States presidents at the time of their inauguration, the current ages of favorite TV actors, or the ages of famous composers, writers, artists, or athletes at the time of their greatest accomplishments or deaths, and so on. They should record these ages using mixed numbers in simplest form.
- Challenge students to express the ages of the same family members and friends first in years and days and then in fractions of a year, in simplest form, based on that new data. Have them use 365 for the number of days in a year.

Fraction Rollers, Part 2

How can you make the greatest mixed number given three digits? How can you make the least mixed number?

GOAL: Students play a game in which they create and compare mixed numbers.

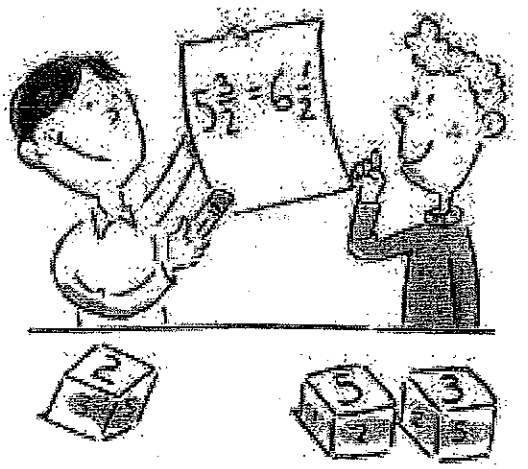
MATERIALS: 1–6 number cubes (p. 85), index cards

The Plan

1. Have students form pairs. Provide each pair with a set of three number cubes. (Alternatively, they can roll one cube three times.) Tell students that they will play a game in which they will create mixed numbers by rolling the number cubes.

2. Present the rules for play:
   - Each player rolls the number cubes to get three digits. Players should write the digits on scrap paper. The player uses those digits to form the greatest possible mixed number the digits can form. For example, with a roll of 2, 3, and 5, the greatest possible mixed number he or she can form is $6\frac{1}{2}$ ($5\frac{3}{2} = 6\frac{1}{2}$).
   - The player with the greatest number for each round wins a point. No points are given for a tie.
   - The first player to reach 10 points wins.

3. Vary the rules so that players try to make the least possible mixed number using the three digits rolled. In this case, the winner each time is the player with the lesser mixed number. Or vary the game to include three players; here, the winner can be the player with the greatest (or least) mixed number or the one whose number falls in the middle.



4. For whichever version of the game your students play, have them summarize the components of a winning strategy.

Follow-Up

- Add some excitement by selecting a student "sportscaster" to offer a play-by-play of the action as pairs play. The sportscaster explains to the audience (other classmates) what players do and the strategies they use.
- Have students make up their own game in which they use cards, number cubes, spinners, or other manipulatives to compare mixed numbers. Guide them to think through their games and test them before writing the rules on index cards. Then have students present them to the class. Invite them to demonstrate their games. You may wish to have students contribute to a class book or folder of fraction games.

NOTING FRACTIONS

Did you know that standard musical notation involves the use of fractions?

GOAL: Students compute with fractions using musical notation as a code.

MATERIALS: student page 56

THE PLAN

1. Ask students whether they know how to read musical notation. Explain that in musical notation, the shape and color of a note indicates how long to sing or play it. For example, two half notes have the same duration as one whole note.

2. Copy the illustrated musical notation chart shown at right onto the chalkboard or chart paper. Invite knowledgeable volunteers to help you explain the standard notation of whole notes, half notes, quarter notes, eighth notes, and sixteenth notes. Help students identify the pattern in the progression from whole note to its fractional parts. Point out that the whole note looks like a clear oval. The half note has the same oval, but with a stem. The quarter note looks like the half note, but the oval is filled in. The eighth note looks like the quarter note, but has a small "flag" waving from the top of the stem. The sixteenth note looks like the eighth note, but has two "flags" on the stem.

Name	Note	Value
whole note	𝅝	1
half note	𝅗𝅥	$\frac{1}{2}$
quarter note	♩	$\frac{1}{4}$
eighth note	♪	$\frac{1}{8}$
sixteenth note	𝅘𝅥𝅯	$\frac{1}{16}$

3. Draw a series of musical notes on the chalkboard. Ask volunteers to envision the notes as a code that represents fractions. Guide them to write a numerical equation based on the musical phrase. Explain that when eighth notes or sixteenth notes are repeated, they may share "flags" like this:

4. Duplicate and distribute copies of page 56. Invite students to work on this page independently or in pairs.

FOLLOW-UP

- Invite the school music teacher to follow up with further lessons on musical notation. Students might learn about the function of the dot (when a note is followed by a dot, the dot signifies augmenting the original note by $\frac{1}{2}$ its value; so, a dotted quarter note is worth $\frac{1}{4}$ + half of $\frac{1}{4}$, which is $\frac{1}{8}$).
- Extend by having students create their own addition and subtraction equations using musical notation. Or have them translate standard fraction equations into musical notation.

Name _____ Date _____

NOTING FRACTIONS

Each musical note has a certain fractional value.

Use the chart to solve these equations. Rewrite the musical notes as a fraction sentence. Give each answer as a fraction or mixed number.

Name	Note	Value
whole note	𝅝	1
half note	𝅗𝅥	$\frac{1}{2}$
quarter note	♩	$\frac{1}{4}$
eighth note	♪	$\frac{1}{8}$
sixteenth note	𝅘𝅥𝅯	$\frac{1}{16}$

1. 𝅗𝅥 + ♩ $\frac{1}{2} + \frac{1}{4} = \frac{3}{4}$
2. 𝅗𝅥 + ♩ + ♫ _____
3. ♩ + ♪ + ♫ _____
4. 𝅝 + 𝅝 + ♩ + ♪ _____
5. 𝅗𝅥 + ♩ + ♩ + ♩ + ♪ _____
6. 𝅝 + 𝅘𝅥𝅯 + ♫ _____
7. 𝅗𝅥 + ♪ + 𝅝 + ♩ + ♪ _____
8. ♫ + ♫ + ♪ + ♫ _____

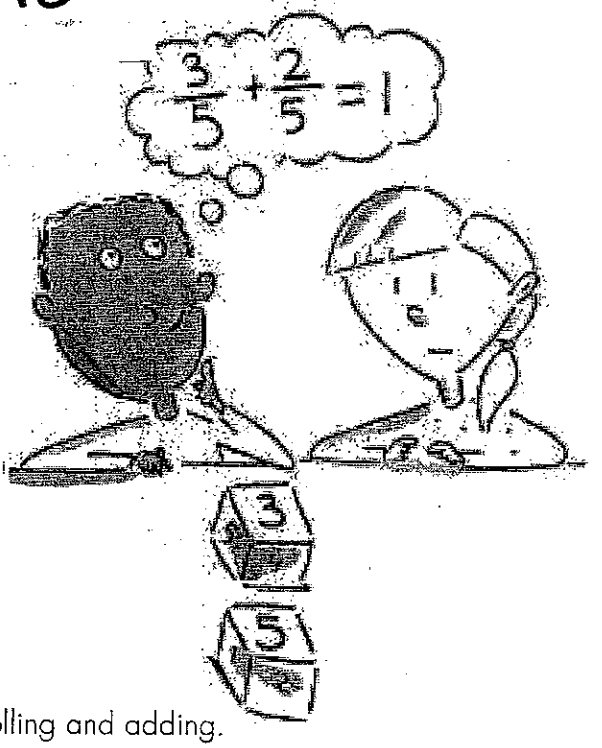
Now rewrite these standard fraction equations as musical phrases. Give the sum as a fraction or mixed number.

9. $\frac{1}{4} + \frac{1}{4} + \frac{1}{4} + \frac{1}{8} =$ ♩ + ♩ + ♩ + ♪
10. $\frac{1}{2} + \frac{1}{4} + \frac{1}{8} + \frac{1}{8} =$ _____
11. $1 + 1 + \frac{1}{2} + \frac{1}{16} + \frac{1}{16} =$ _____
12. $\frac{1}{2} + \frac{1}{2} + 1 + \frac{1}{2} + \frac{1}{4} =$ _____
13. $1 + 1 + \frac{1}{4} + \frac{1}{4} + \frac{1}{8} + \frac{1}{16} =$ _____

PREPARE TO SHARE

How would you write a note whose value is $\frac{1}{32}$? Explain on the back of this page.

A Head for Fractions



Can you use mental math to find sums of fractions?

GOAL: Students play a game in which they use mental math to find whole-number sums.

MATERIALS: 1–6 number cubes (p. 85) (or spinner, p. 90)

THE PLAN

1. Have students form groups of three. For each game, two students play and one is the judge. Provide each group with a pair of number cubes.

2. Introduce the rules of play:
   - Determine an order of play. Players will take turns rolling and adding.
   - The first player rolls the two number cubes, using the numbers shown to form a fraction—the lesser number is the numerator. (If a player rolls the same number on both cubes, he or she rerolls.)
   - The second player uses mental math to determine and then announce the fraction to add to that fraction to equal a sum of 1. If the player names the correct addend, he or she gets 1 point. No points are deducted for incorrect answers.
   - The judge can use either mental math or pencil and paper to check the answer. The judge also keeps score.
   - The first player to get 10 points wins.

3. After a game, students switch roles so that the judge becomes a player.

4. You can vary the game by changing the target sum. For example, have students try sums of 2 or 3, or of $1\frac{1}{2}$ or $2\frac{1}{2}$.

5. Ask students to explain the mental math strategies they used to find the sums. Encourage all sensible approaches. Invite students to demonstrate their strategies.

FOLLOW-UP

- Challenge students by allowing them to use the number-cube rolls in any order to form the fractions. In this version of the game, students may have to subtract to reach the target sum.
- Have students use three number cubes to form a mixed number in any way they wish. For example, a roll of 1, 3, and 6 can be interpreted as a mixed number such as $1\frac{3}{6}$, $3\frac{1}{6}$, $6\frac{1}{3}$, and so on. Then have students mentally add or subtract mixed numbers. For this version of the game, make a greater target sum. For instance, have players find sums of 5 or 6. Or challenge them to find sums like $7\frac{1}{2}$.

Fractions in Ancient Egypt

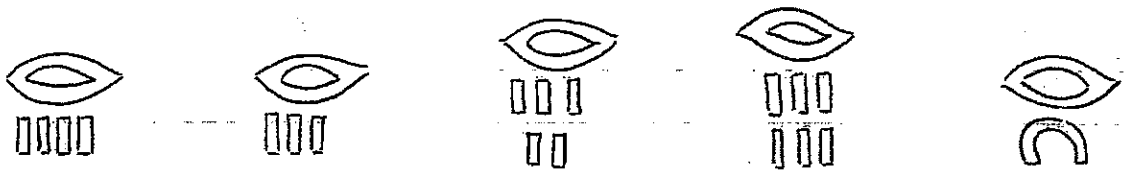
Can you form fractions the way the ancient Egyptians did?

GOAL: Students use ancient symbols and rules to form fractions.

MATERIALS: student page 59

The Plan

1. Explain to students that several thousand years ago, the early Egyptians developed and used a system for expressing fractions. Copy the following ancient Egyptian fractions on the chalkboard or a poster.



$\frac{1}{4}$ $\frac{1}{3}$ $\frac{1}{5}$ $\frac{1}{6}$ $\frac{1}{10}$

2. Have students examine these fractions and then practice writing them. Next, guide students to notice the pattern they follow, and help them describe it. Tell students that except for a few special fractions, all ancient Egyptian fractions used numerators of 1.

3. Write the following three exceptions on the board. Go over these exceptions with students. Again, have them practice writing the symbols for the fractions.

$\frac{1}{2}$ or $\frac{1}{2}$ $\frac{2}{3}$ $\frac{3}{4}$

4. Tell students that when Egyptians formed fractions, they did not simply combine unit fractions. Show and discuss these two examples:

$\frac{5}{6} = \quad + \qquad \frac{3}{5} = \quad +$

5. Distribute copies of student page 59. Pair students to work together on the problems. Invite them to draw their solutions on the chalkboard. Allow time for students to explain how they followed the rules to form their fractions.

Follow-Up

⊛ Invite pairs of students to form other fractions using Egyptian fraction rules.

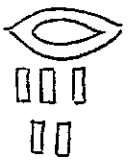
Name_____ Date_____

Fractions in Ancient Egypt

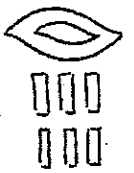
In ancient Egypt, fractions looked like this:

$\frac{1}{4}$

$\frac{1}{3}$



$\frac{1}{5}$

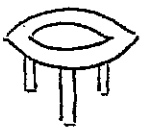


$\frac{1}{6}$

$\frac{1}{10}$

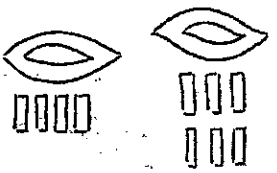
$\frac{1}{2}$

$\frac{2}{3}$



$\frac{3}{4}$

Example: $\frac{5}{12}$ =



Draw ancient Egyptian fractions for each of the following.

1. $\frac{3}{4}$ =

2. $\frac{1}{2}$ =

3. $\frac{2}{3}$ =

4. $\frac{5}{12}$ =

5. $\frac{7}{12}$ =

6. $\frac{5}{6}$ =

Flicker Fraction Sums

Can your team flick its way to high sums?

Goal: Students strengthen their skills at adding fractions by playing a board game.

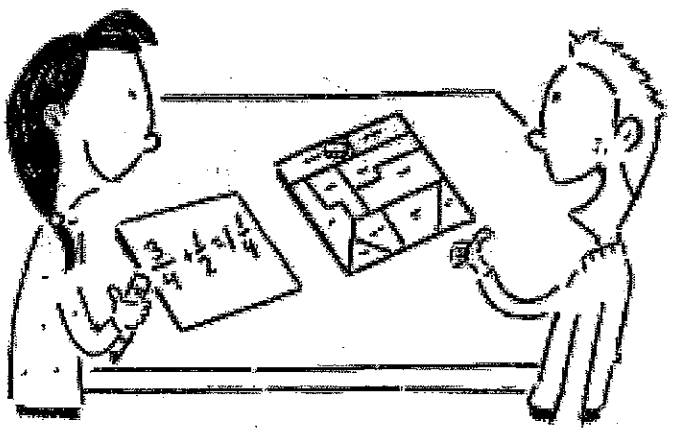
Materials: pennies or checkers, student pages 61–62 (rules and game board)

The Plan

1. Divide the class into teams of four students. Provide each team with a copy of the rules of play and a game board. Give each team a penny or checker to flick.

2. Explain that the object of the game is for each teammate to flick the penny (or checker) from its base on the playing board to achieve the greatest possible sum. Demonstrate how to do a proper flick. Urge students to flick the penny gently so that it doesn't fly in the air. Guide students to realize that the difficulty level for landing on the fractions varies.

3. Go over the rules together so that students understand them. Focus particularly on the rules that determine whether a coin has or has not landed on a fraction space.



4. Advise teams to keep a running total of their scores. The accuracy of their final sum can be checked by an impartial judge (you or a designated student or jury of students).

5. Have teams play several games during class. Teams can pair up and play against each other, in single elimination tournaments, or all teams can play at once and the highest-scoring team wins.

6. You may wish to keep the game in your math center for students to play as time allows.

Follow-Up

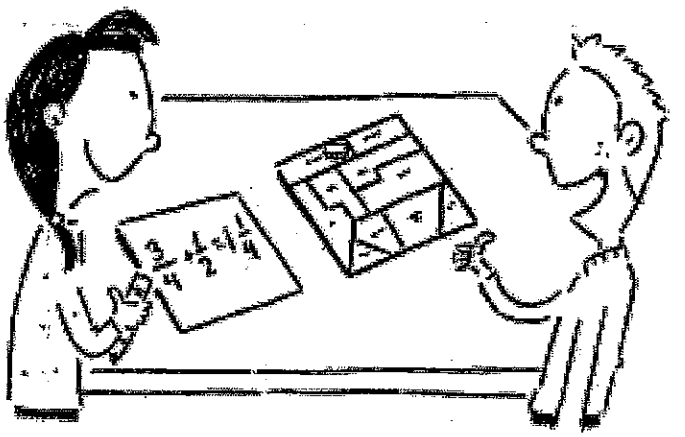
- Vary the game by having students create their own set of fractions for the board. Or invite them to change the size, shape, or number of the different regions on the board. You might even challenge them to change the shape of the board itself. For instance, they can make a 10-pointed star or an irregular shape.
- Challenge students to vary the rules—for example, changing the number of flicks a player gets.
- Challenge teams to get closest to without exceeding the target sum.

Name _____ Date _____

FLICKER FRACTION SUMS—RULES

PLAY: This game involves flicking a penny and adding fractions. You score when your penny lands totally inside one of the spaces. Your goal is to get the highest total score with all your flicks.

Here's how to play:



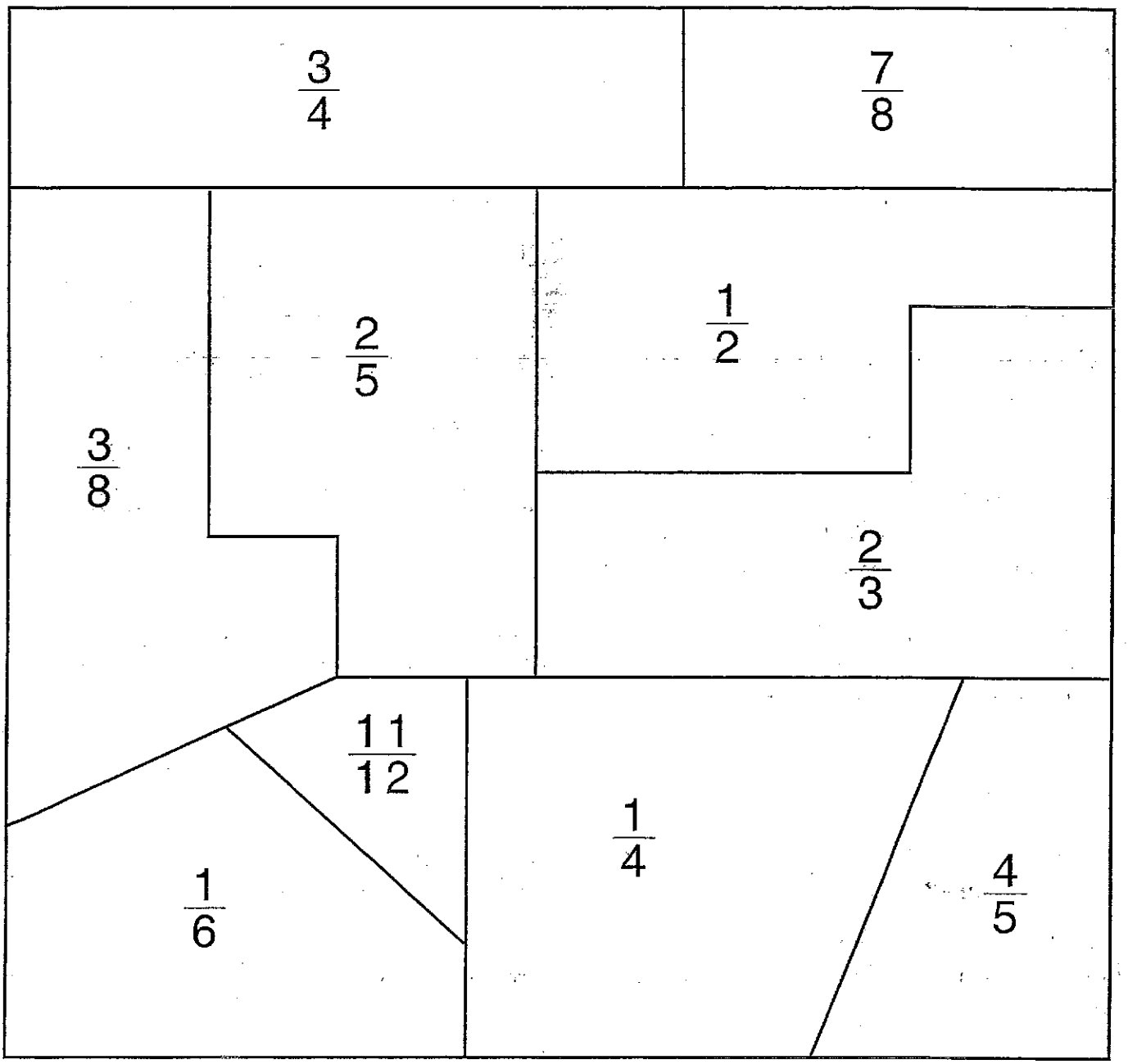
1. Put the game board on the floor or on a desktop. Place the penny inside the START space.
2. Players take turns flicking the penny. Always begin each new flick by putting the penny back in the START space.
3. Write down the fraction the penny lands on, then add that value to any previous score. Keep a running total for your team.
4. To score, the penny must land entirely inside a space. The score for that flick is the value of the fraction in that space. If any part of the coin touches any part of a line, the score is 0 for that flick.
5. Each player takes four turns in all. The team's final score is the sum of all valid flicks by all players.
6. When everyone on a team has had four flicks, the game ends for that team. Give your team's running score to the judge, who will check your addition.

That's it for the rules. Are you ready?
Choose an order of play for your team, and flick away.
Good luck!

PREPARE TO SHARE

How would you adjust the rules to make an even better game? Explain on the back of this page.

Flicker Fraction Sums—Game Board



Fraction Add-Up

Can you choose the addends if you know the sums of fractions and mixed numbers?

GOAL: Students strengthen fraction adding and subtracting skills by following rules to find addends that yield given sums.

MATERIALS: student page 64

The Plan

1. Tell students that in this activity, they must come up with addends to equal a sum they will already know. Remind them that they already know an appropriate strategy to use: work backward.

2. Ask students to imagine that they are in a health food store near a national park. Have them pretend that they are putting together a combination of foods to take along on a hike. Then present the following problem: "You want exactly 2 cups of trail mix made from peanuts, chocolate-covered raisins, and dried apple slices. You want different amounts of each ingredient, each amount less than 1 cup. How much of each ingredient do you get?"

3. Provide time for students to come up with their answers. Then ask volunteers to present their combinations and to explain what they did to arrive at those choices. Emphasize that many answers are possible, as long as the solutions follow the rules of the problem.

4. Duplicate and distribute copies of page 64, one per student. Go over the information on the page. Explain that the foods listed are commonly found in trail mixes, which are designed to provide hikers with maximum energy but minimum weight.

5. Emphasize the importance of reading each question carefully, as each situation places a different demand on the problem-solver. Remind students that questions have multiple solutions.

6. When students have finished, have them form small groups to compare answers and solution methods.

Follow-Up

- Have students formulate similar problems for partners to solve. Invite them to use all or some of the foods listed or to add some of their own to the collection.
- Vary the activity by assigning weights, in fractions of a pound, to each of the foods. Challenge students to find combinations of foods that fit given weights and to make up questions using this new data.
- As a challenge, assign prices—per pound, half-pound, and quarter-pound—to each item. Create basic trail mix problems (or have students create problems) that involve both quantities and total prices. Keep in mind that such problems require an intuitive understanding of multiplying fractions and money amounts.

Name _____ Date _____

Fraction Add-Up

raisins	almonds
dried apple slices	yogurt-covered peanuts
dried cherries	pretzel nuggets
coconut flakes	sesame crisps
peanuts	
cashews	
chocolate-covered raisins	

Choose from the foods shown to make each trail mix blend described. Read each set of rules carefully. Give your answer as a labeled number sentence with fractions and/or mixed numbers. The first one has been done for you.

1. Make a 1-cup mix of almonds and pretzel nuggets. Use a different amount of each ingredient.

   $\frac{3}{4}$ cup almonds + $\frac{1}{4}$ cup pretzel nuggets = 1 cup mix

2. Make a 2-cup mix of three ingredients. Use $1\frac{1}{2}$ cups of yogurt-covered peanuts and two other foods. Use a different amount of each.

3. Make a 2-cup mix of four different ingredients. Use the same amount of two foods and different amounts of the remaining two. Use less than 1 cup of each food.

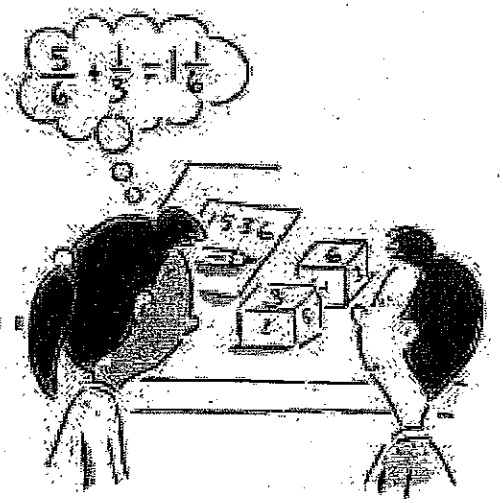
4. Make a 3-cup mix of four different ingredients. Use more than 1 cup of two foods and less than 1 cup of two others. Use different amounts of each ingredient.

5. Choose five ingredients. Use a different amount of each. Get enough to make more than 4 cups but less than 5 cups.

6. Choose a different amount of each of three ingredients. Then pick a different amount of each of three other ingredients so that both blends have the same number of cups.

SUMS ON A ROLL

How would you arrange four digits into two fractions to produce the greatest sum? The least sum?



GOAL: Students strengthen their number sense and skills at adding fractions and at comparing fractions and mixed numbers.

MATERIALS: 1–6 number cubes (p. 85)

THE PLAN

1. Have students form pairs. Provide each pair with two number cubes. Then tell them that they will play a game in which they create and add fractions.

2. Present the rules for play:
   - The goal of the game is to make a pair of fractions that produce the greatest sum.
   - Each player rolls the number cubes twice to get four digits. He or she records the digits and then uses them to form two fractions, each having a numerator that is less than its denominator. Here's an example: a student rolls 1, 5, 3, and 6. The greatest possible sum is $1\frac{1}{6} = \frac{5}{6} + \frac{1}{3}$.
   - The player with the greatest sum wins a point. No points are given for a tie.
   - The first player to reach 10 points wins.

3. You may wish to vary the rules in one or more of the following ways:
   - Have players try to make fractions that have the least sum or the greatest sum that does not exceed 1.
   - Have students play in groups of three. In this case, the winner can be the player with the greatest sum, the least sum, or the one with the sum in the middle.
   - Allow players to form fractions in any way they wish, not only with smaller numerators.

4. Whatever version of the game students play, remind them how to express improper fractions as mixed numbers.

5. Emphasize that finding the greatest (or least) sum is likely to be a trial-and-error process. Encourage students to communicate winning strategies as they play.

FOLLOW-UP

- As an alternative, post a set of fractions with different denominators on an interactive bulletin board. Students can rearrange the terms of two of these fractions to make a pair of new fractions that will have a greater (or lesser) sum than the original.
- Extend the game by having students play with a 1–8 spinner or 1–10 number cards.

Fraction Path Puzzles

Can you complete a puzzle that involves adding and subtracting fractions?

GOAL: Students use logical reasoning, number sense, and their understanding of adding and subtracting fractions to complete three fraction path puzzles.

MATERIALS: student page 67

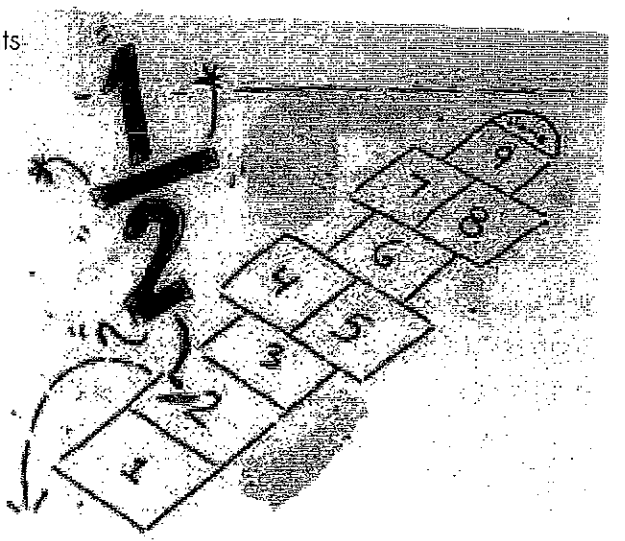
The Plan

1. Write the following incomplete number sentence on the board: $\frac{1}{2} \square \frac{1}{4} = \frac{3}{4}$. Ask students to determine the operation sign that belongs in the box (+) and to give their reasons.

2. Tell students that you are going to give them three different fraction path puzzles that are missing the operation signs for addition (+) and subtraction (−).

3. Have students work individually or in pairs. Duplicate and distribute page 67. Go over the path puzzles together to ensure that students understand how to approach them. Point out that each puzzle is missing operation signs; students must decide which sign goes where so that the string of computations from START to the shaded box works to yield the final number, 0.

4. You may want to provide students with some hints to help them complete this task, which they may find challenging. Possible suggestions include:
   - Guess and check; revise as necessary.
   - Work backward from the final number.
   - Rewrite all fractions in equivalent form, all with the same denominator.
   - Use manipulatives.



Follow-Up

- As a simpler alternative, present similar but shorter fraction path puzzles.
- Extend by having students create their own fraction path puzzles.

Name _____ Date _____

Fraction Path Puzzles

Can you complete the fraction puzzle path?

Write a + or − sign in each blank square to form a fraction path that ends at 0.
Check your work on scrap paper.

START

$\frac{1}{4}$		$\frac{1}{2}$		$\frac{3}{4}$	=	0

START

$\frac{1}{2}$		$\frac{2}{3}$		$\frac{5}{6}$
2	=	0		

START

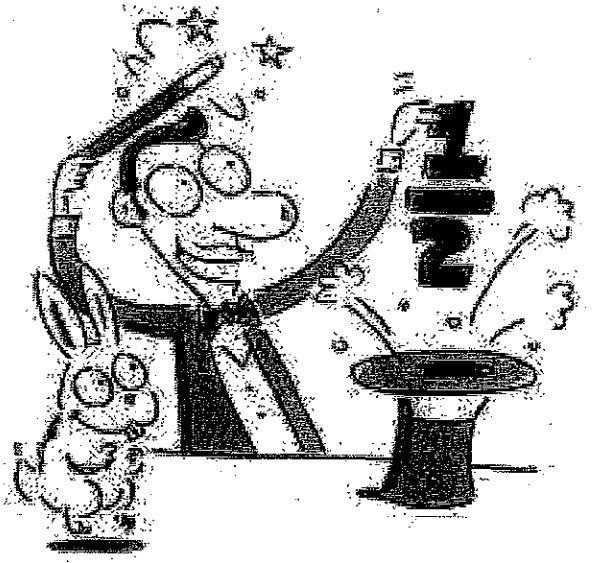
$\frac{1}{2}$		$\frac{2}{3}$
$\frac{1}{4}$		$\frac{5}{6}$
$\frac{7}{12}$	=	0

PREPARE TO SHARE

How did you decide which operation to use?

Fraction Magic Figures

Can you complete puzzles that involve adding and subtracting fractions?



Goal: Students use logical reasoning, number sense, and their understanding of adding and subtracting fractions to complete four magic figures puzzles.

Materials: student page 69

The Plan

1. Write the following incomplete number sentence on the board: $\frac{1}{2} + \square = \frac{3}{4}$. Ask students to determine the missing fraction that would correctly complete the number sentence, and to give their reasons. ($\frac{1}{4}$)

2. Review the concept of the magic square. Most students will have had experience with these common puzzles, in which the sum of all numbers in every row, column, and diagonal is the same—the magic number.

3. Tell students that you will give them four different fraction magic figures puzzles—one triangle and three different squares. Guide them to notice that each puzzle is missing some of the fractions (and/or mixed numbers) that will complete it.

4. Have students work individually or in pairs. Duplicate and distribute page 69. Go over the puzzles together to ensure that students understand how to approach them. Point out that students must determine the missing numbers that will make the sum of each row, column, and diagonal yield the magic number. Be sure students understand that each figure has its own unique magic number.

5. You may want to provide students with some hints to help them complete this task, which they may find challenging. Possible suggestions include:
   - Guess and check; revise as necessary.
   - Work backward from the magic number.
   - Rewrite all fractions in equivalent form, all with the same denominator.
   - Use manipulatives.

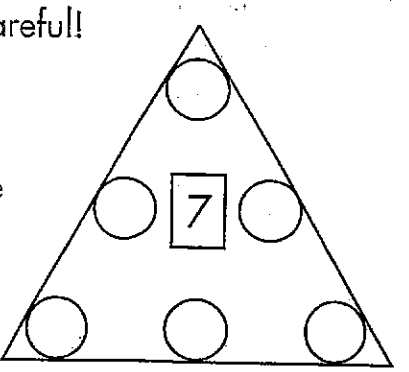
Follow-Up

- As an alternative, present simpler (or harder) fraction magic squares puzzles.
- Extend by having students create their own fraction magic squares puzzles.
- Challenge students to solve a fraction magic square puzzle in which no row, column, or diagonal is complete; students must determine the magic sum on their own.

Name _____ Date _____

Fraction Magic Figures

Follow the directions to fill in the four fraction figures. But be careful! These figures can be tricky!



1. Write the numbers $1\frac{1}{3}$, $1\frac{2}{3}$, 2, $2\frac{1}{3}$, $2\frac{2}{3}$, and 3 in the circles so that the sum of the three numbers along each side of the figure equals the number written inside the figure.

2. Use the numbers $\frac{1}{3}$, 1, $2\frac{1}{3}$, $2\frac{2}{3}$, and 3 to complete the magic square. The sum of the three numbers in each row, in each column, and in each diagonal must be 5.

		2
	$1\frac{2}{3}$	
$1\frac{1}{3}$		$\frac{2}{3}$

3. Complete this magic square. Use the numbers $1\frac{1}{2}$, 3, $4\frac{1}{2}$, and 12. Make the magic sum the same in each row, column, and diagonal.

		6
	$7\frac{1}{2}$	$13\frac{1}{2}$
9	$10\frac{1}{2}$	

4. Complete this magic square. Use the numbers $\frac{5}{8}$, 1, $1\frac{1}{4}$, $1\frac{3}{8}$, $1\frac{1}{2}$, $1\frac{3}{4}$, and $1\frac{7}{8}$. Make the magic sum the same in each row, column, and diagonal. (HINT: First figure out the magic sum.)

2	$\frac{1}{4}$	$\frac{3}{8}$	$1\frac{15}{24}$
$\frac{9}{8}$	$\frac{7}{8}$	$\frac{3}{4}$	
$\frac{1}{2}$			$\frac{1}{8}$

PREPARE TO SHARE

How did you begin to solve these problems? Explain your strategy on the back of this page.

Parts of Parts

How can you model what it means to multiply fractions?

Goal: Students use grid paper and counters to visualize the concept of multiplying two fractions, leading to an understanding of the algorithm.

Materials: centimeter grid paper (p. 88), scissors, two colors of counters, student page 71

The Plan

1. Duplicate and distribute sheets of grid paper to students. Have them use scissors to cut out a 4 x 4 and a 6 x 6 grid from the paper.

2. Have them place the 4 x 4 grid on the center of their work area and use counters of one color to cover $\frac{1}{2}$ the grid. Ask: "How many squares did you cover?" (8) Now have students use the second color of counters to cover $\frac{1}{2}$ of that half. Ask: "How many squares have two counters on them? (4) What fraction of the whole grid is covered with two counters?" ($\frac{1}{4}$)

3. Ask a volunteer to write a number sentence that fits what you just modeled: $\frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$. Reiterate what students modeled—they found a fraction of a fraction. Restate the meaning of the related number sentence in words: Half of one-half is one-fourth.

4. Now have students use the 6 x 6 grid and the counters to model $\frac{1}{6} \times \frac{1}{2}$. Have them first cover $\frac{1}{6}$ of the grid with one color of counters, then cover $\frac{1}{2}$ of that $\frac{1}{6}$. Record the model in a number sentence: $\frac{1}{6} \times \frac{1}{2} = ?$ ($\frac{1}{12}$)

5. Duplicate and distribute page 71 for students to work on individually or in pairs.

Follow-Up

- Summarize the activity by having students write complete number sentences to match their models. Encourage students to look for a pattern in the number sentences that can lead them to derive an algorithm for multiplying fractions. (*Multiply the numerators, multiply the denominators, simplify the product, if possible.*)
- Extend the activity by having students model similar fractions of fractions on 8 x 8 or 10 x 10 grids. With larger grids they can model a greater variety of fractional parts.

Name _____ Date _____

PARTS OF PARTS

Use a 4 x 4 grid and two colors of counters to model these fractions.

1. Cover $\frac{1}{2}$ of the grid with one color counter.
   Cover $\frac{1}{4}$ of that $\frac{1}{2}$ with the other color counter.
   What fraction of the whole grid is covered with two counters? _____

2. Cover $\frac{1}{4}$ of the grid with one color counter.
   Cover $\frac{1}{2}$ of that $\frac{1}{4}$ with the other color counter.
   What fraction of the whole grid is covered with two counters? _____

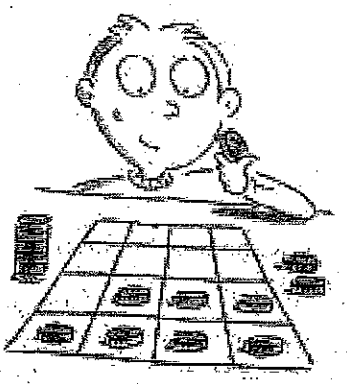
3. Cover $\frac{3}{4}$ of the grid with one color counter.
   Cover $\frac{1}{2}$ of that $\frac{3}{4}$ with the other color counter.
   What fraction of the whole grid is covered with two counters? _____

Use a 6 x 6 grid and two colors of counters to model these fractions.

4. Cover $\frac{1}{2}$ of the grid with one color counter.
   Cover $\frac{1}{3}$ of that $\frac{1}{2}$ with the other color counter.
   What fraction of the whole grid is covered with two counters? _____

5. Cover $\frac{1}{3}$ of the grid with one color counter.
   Cover $\frac{1}{2}$ of that $\frac{1}{3}$ with the other color counter.
   What fraction of the whole grid is covered with two counters? _____

6. Cover $\frac{2}{3}$ of the grid with one color counter.
   Cover $\frac{1}{2}$ of that $\frac{2}{3}$ with the other color counter.
   What fraction of the whole grid is covered with two counters? _____

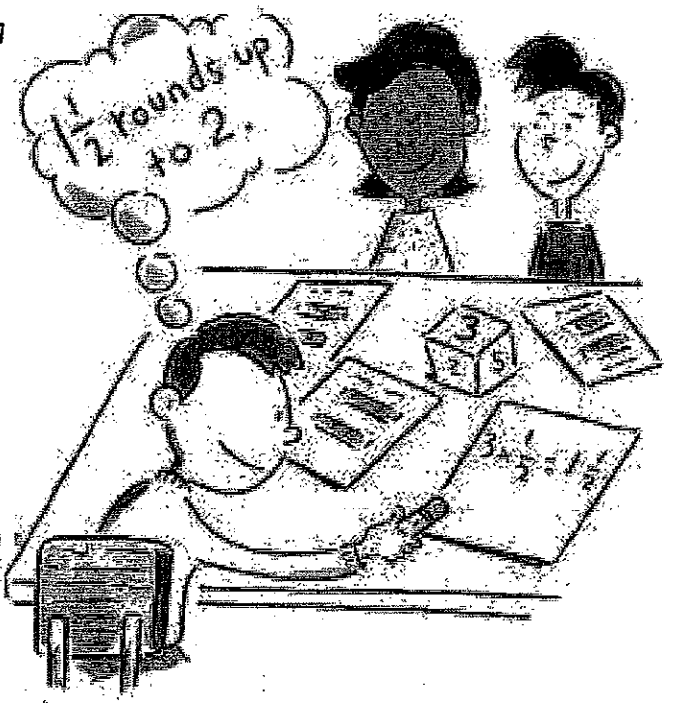


PREPARE TO SHARE

Can you develop a rule for multiplying fractions? Explain on the back of this page.

Roll, Round, and Record

Can you correctly multiply a fraction or mixed number by a whole number and then round the product to the nearest whole?



GOAL: Students play a game to practice multiplying fractions and mixed numbers and rounding products.

MATERIALS: student page 73, 1–6 number cube (p. 85)

The Plan

1. Have students form small groups to play this multiplying and rounding game. Duplicate and distribute page 73. Notice that the page has two games—one with fractions in all "lanes," the other with fractions and mixed numbers. Give each group a number cube.

2. To begin, players pick a lane to use for the game and write their name in the appropriate space.

3. Here's how to play:
   - In turn, each player rolls the number cube and multiplies that number by the first fraction (or mixed number) in his or her lane. The player then rounds the product to the nearest whole number and records the rounded number on a separate score sheet.
   - Each player checks the math of the preceding player.
   - In turn, other players roll, multiply, round, and record their score for the first fraction (or mixed number) in their lane on the score sheet. In subsequent turns, players add the new rounded number to the preceding score to keep a running total as they multiply their way across their lanes.
   - The player with the highest total after completing all turns in the "race" wins.

Follow-Up

- Vary the game by using a number cube or spinner with numbers greater than 1–6.
- Vary the game by changing the numbers in the lanes. Include decimals.

Name _____ Date _____

ROLL, ROUND, AND RECORD

Choose a lane. You will need a number cube.
Roll, multiply, round, and record as you race across your lane.
Keep a running score. Who will win?

GAME 1

Player	1	2	3	4	5
	$\frac{1}{2}$	$\frac{3}{8}$	$\frac{3}{5}$	$\frac{1}{4}$	$\frac{5}{8}$
	$\frac{2}{3}$	$\frac{1}{5}$	$\frac{1}{2}$	$\frac{4}{5}$	$\frac{3}{8}$
	$\frac{1}{2}$	$\frac{5}{6}$	$\frac{3}{4}$	$\frac{1}{5}$	$\frac{4}{5}$
	$\frac{3}{4}$	$\frac{2}{5}$	$\frac{1}{8}$	$\frac{5}{6}$	$\frac{1}{2}$

GAME 2

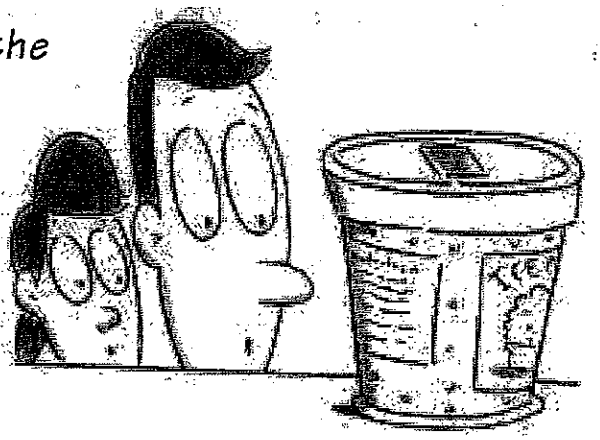
Player	1	2	3	4	5	6
	$\frac{1}{5}$	$2\frac{1}{2}$	$\frac{3}{8}$	$1\frac{1}{4}$	$\frac{5}{6}$	$1\frac{1}{2}$
	$\frac{5}{6}$	$\frac{1}{8}$	$1\frac{4}{5}$	$1\frac{2}{3}$	$\frac{3}{5}$	$3\frac{1}{4}$
	$\frac{2}{3}$	$1\frac{1}{2}$	$\frac{7}{8}$	$2\frac{1}{4}$	$1\frac{5}{6}$	$\frac{1}{2}$
	$\frac{3}{5}$	$\frac{1}{8}$	$1\frac{3}{4}$	$1\frac{1}{3}$	$\frac{3}{4}$	$2\frac{2}{3}$

PREPARE TO SHARE

Does it matter which lane you choose? Explain your thinking on the back of this page.

Fractions and Calories

How can fractions help you figure out the number of calories you burn?



GOAL: Students use their understanding of fractions of an hour to interpret information in two charts and to formulate problems based on the given data.

MATERIALS: student page 75

THE PLAN

1. Explain the meaning of *calorie* (a unit of heat energy supplied by food). Brainstorm with students some foods that are high in calories (pizza, cheeseburgers, and ice cream) and low in calories (vegetables, fish, and fruit). Then discuss the principle that the body burns, or uses up, calories as it performs activity. Point out that the number of calories burned varies with the activity (an active game of handball burns more calories than a seated game of checkers) and is also affected by how long we do the activity (a 1-hour walk burns more calories than a 10-minute walk).

2. Duplicate and distribute page 75 to pairs of students. Go over the data presented. To help students understand the data, ask questions, such as "Which exercise burns the greatest number of calories per hour? Which exercise burns about three times as many calories as walking does?"

3. Focus students' attention on the Calories in Some Snack Foods chart. Help them read and analyze the information presented by asking questions: "Which food listed is highest in calories? Which is lowest in calories? Does any of the data surprise you?"

4. Direct students to answer the questions. Help them give each answer in minutes and as a fraction (or mixed number) of an hour (in simplest form).

5. Discuss answers together when students have finished. Talk about any discrepancies.

FOLLOW-UP

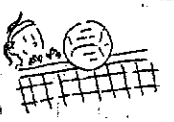
- Extend by helping students expand the top table to include other exercises or everyday activities (strolling, typing on the computer, raking leaves, and so on) and the rate of calories burned for each. Suggest sources where students can find this data.
- Invite students to add foods—and their calorie counts—to the second table.
- Challenge students to find the time it would take to burn greater or lesser amounts of each food. Guide them to use mental math (and their intuitive understanding of proportional reasoning) to figure out these answers. Ask them to explain their reasoning.

Name:_____ Date_____

FRACTIONS AND CALORIES

How many calories do you burn when you exercise?

A 100-pound person burns the following number of calories per hour of each activity:

	Biking	Running	Swimming	Volleyball	Walking
Activity					
Calories Per Hour	320	500	350	125	150

Calories in Some Snack Foods	
hot dog	150 calories
plain cookie	55 calories
8 tortilla chips	80 calories
2 Tbsp. peanut butter	200 calories
1 can regular soda	150 calories
$\frac{1}{2}$ cup ice cream	200 calories
slice of pound cake	250 calories

Use the data from the two charts to answer these questions about Ann, who weighs 100 pounds.

1. Ann eats a hot dog. How long must she walk to burn those calories?_____

2. Ann eats 8 tortilla chips. How long must she bike to burn those calories?_____

3. Ann eats 2 tablespoons of peanut butter. How long must she run to burn those calories?_____

4. Ann eats 3 cookies. Which activity must she do for about a half-hour to burn off the calories? Explain._____

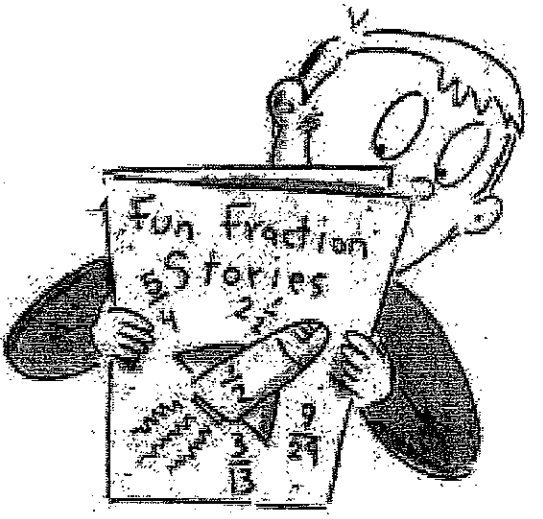
5. Ann has a slice of cake and a can of soda. What fraction of the calories will she burn if she swims for an hour? Explain._____

_____

6. Ann takes a 4-hour walk. How much ice cream can she eat and not have any calories left over? Explain._____

_____

Fraction Stories



Can you create story problems that you can solve by using fractions?

GOAL: Students write and illustrate story problems involving operations with fractions.

MATERIALS: binder, paper, crayons

The Plan

1. Read the following aloud to students: "A train is 9 cars long. Two-thirds of the cars carry passengers. One-third of the cars carry freight. How many cars are passenger cars?" (6)

2. Ask students to explain how they would use fractions to solve this problem. Also ask them to make a sketch to illustrate the problem and its solution.

3. Guide students to recognize that they multiplied by a fraction ($9 \times \frac{2}{3}$) to solve the train problem. Then present problems they can solve by adding or subtracting fractions. For example: "Gene ate $\frac{1}{2}$ of the cake after dinner. Before he went to sleep, he ate another $\frac{1}{3}$ of it. What fraction of the cake did Gene eat in all?" Or: "An ant has climbed $2\frac{1}{4}$ feet up the leg of a picnic table piled high with treats. If the tabletop is $3\frac{3}{4}$ feet high, how much farther must the ant climb to get at the goodies?" Discuss students' solutions to these problems, and invite them to illustrate the problems and solutions.

4. Tell students that they will create fraction story problems. Ask each student to write three (or more) fraction stories that you will collect in a binder entitled "Fun Fraction Stories." Have students write one problem per page, accompanied by a sketch of it. Ask them to provide the answer on a self-stick note.

5. Encourage students to make their fraction story problems about real-life activities, using actual or made-up data. Stories can be short or long and may consist of multistep problems to be solved by understanding, adding, subtracting, or multiplying fractions.

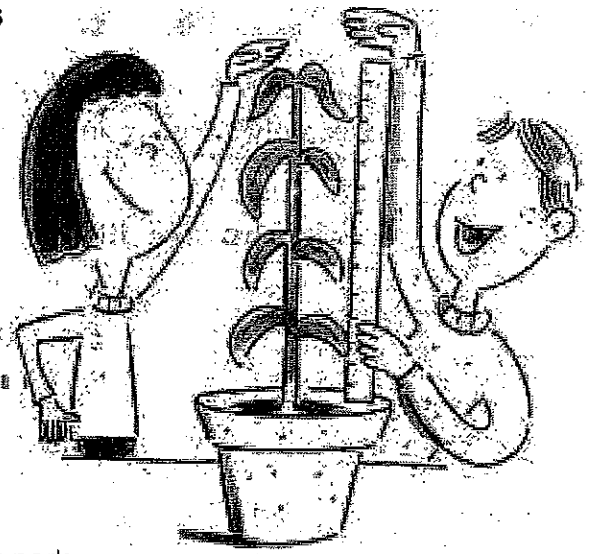
6. Collect students' completed stories and bind them. Create a solution page in the back. Display the book for students to use. Invite additional contributions at any time.

Follow-Up

- Challenge students to write problems that involve more than one concept, such as fractions and money, fractions and measurement, or fractions and geometry.
- Display some of the best story problems or those particularly well illustrated.
- Have students create an online fraction storybook.

Fraction Scavenger Hunt

How clever are you at finding fractions around you?



GOAL: Students make visual estimates and then measure to locate items that fit given descriptions.

MATERIALS: student page 78, rulers

THE PLAN

1. Explain what a scavenger hunt is—a game that involves searching for items on a given list. Have students work in pairs. Decide whether to restrict the search to the classroom or to extend it to include other parts of the school environment.

2. Duplicate and distribute page 78 to each pair of scavengers. Provide rulers. Take a few minutes to go over the items on the search list. Then set a reasonable time limit for pairs to work their way down the list to find an example of each item on it. Point out that students need not search for items in the order given. Explain that when the time runs out, the winning pair will be the one that has found the greatest number of items.

3. As needed, talk about how to make estimates. You might introduce the idea of using a benchmark as an estimating aid. For example, knowing that a sheet of notebook paper is 11 inches long may help students estimate lengths of 1 foot. Encourage pairs to come up with their own benchmarks to guide them in their hunt.

FOLLOW-UP

- When the time is up, have pairs post their lists, share their findings, and compare notes about the hunt. Invite them to tell what about the search was easiest and most difficult. Encourage students to share insights they gathered during the activity.
- Extend by having students search for items that weigh a particular amount, perhaps $\frac{1}{4}$ pound or $2\frac{1}{2}$ pounds. Or challenge them to brainstorm a list of things that take a certain length of time to do—for example, $\frac{1}{2}$ minute, $\frac{1}{4}$ hour, or $1\frac{1}{2}$ hours.

Name _____ Date _____

Fraction Scavenger Hunt

You will need a ruler and a pencil. Work in pairs to fill in the table as quickly as you can. Measure accurately! How many items can you find?

Description of Item	What We Found
1. Something about $\frac{1}{2}$ inch long	
2. Something about 2 inches long	
3. A pencil about $\frac{1}{3}$ of a foot long	
4. Something about $1\frac{1}{2}$ feet long	
5. A tool about $\frac{3}{4}$ of a foot long	
6. Something about $\frac{2}{3}$ of a yard in length	
7. A drawer about a third of a foot high	
8. Something between 2 and $2\frac{1}{2}$ feet high	
9. A box about $2\frac{1}{2}$ inches wide	
10. A book about $3\frac{1}{2}$ inches thick	
11. Something about half your height	
12. Something about 5 feet from a door	
13. A cabinet or shelf about $3\frac{1}{2}$ feet tall	
14. Something $1\frac{1}{2}$ times as long as it is wide	
15. A shoe less than 1 foot long	
16. Two people, one of whom is about $4\frac{1}{2}$ inches taller than the other	

Prepare to Share

What did you like best about this activity? What was hardest? Explain on the back of this page.

Only One-Third Agreed That...

How can you use fractions to describe the results of a survey?

GOAL: Students poll classmates on a topic of their choice and then interpret the results.

MATERIALS: none

The Plan

1. Discuss with students what a survey is and how and by whom surveys are used. Talk about the usefulness of surveys and, if appropriate for your class, the problems inherent in them. If possible, show students an example of a survey, perhaps one you received in the mail or one in a local newspaper. Invite students who have participated in surveys to describe their experiences.

2. Then have students form small groups. Have each group brainstorm a list of topics on which to survey classmates. Guide them to consider topics of interest to them, from favorite TV programs, music groups, or sports, to their views on environmental, civic, or legal issues. One student in each group will act as secretary and record its survey questions.

3. Point out that questions within a poll need not be related. Once groups have settled on a list of topics to pursue, guide them to write the specific questions they would like to ask. Direct them to word each question so that it is easy to understand. Guide them to provide a selection of short answers that can be easily recorded. For example, questions about favorite things could list 3–5 reasonable choices from which all respondents must select. Questions about issues of interest to students can call for answers like Yes or No, True or False, Agree or Disagree, I Support or I Oppose.

4. Provide time for groups to prepare and edit their survey questions. Then collect the questions, duplicate them, and distribute them to each student in the class.

5. Allow time for students to answer the survey questions thoughtfully. Then collect all the forms and give them back to the group that generated each so that members can see how their classmates responded to their questions.

6. Talk with students about ways to use fractions to describe the results of their surveys. Then give groups time to do a fractional analysis.

7. Have groups summarize and present their findings to the class. Guide them to use fractions in their analyses as much as possible.

Follow-Up

- Talk about what the results of all the surveys tell students about their views and about themselves. Talk about what students have learned from the process, discussing ways that using fractions is helpful. Then talk about ways to improve on all aspects of the polling process for the next time.

Fractions Every Day

How do people use fractions in their daily lives?

GOAL: Students interview people to learn what they know about fractions and how they use them.

MATERIALS: fraction surveys (see below), clipboards (optional), tape recorders (optional)

The Plan

1. Ask students to guess what people they know will say when asked questions about the meaning of fractions or about how they use fractions in their everyday lives. Then tell students that they are going to undertake an activity to find out these answers.

2. As a class, generate a list of questions to ask family members, friends, and members of the school community. Here are some examples; many others are possible:
   - What is a fraction?
   - Do you ever add, subtract, multiply, or divide with fractions? Explain.
   - How is a fraction like a decimal?
   - What is the hardest thing to understand about fractions? What is the easiest?
   - How do you use fractions at work? At play?
   - How do you use fractions when you shop? When you cook? When you sew?
   - How do you use fractions when you do household chores?
   - Where do you see fractions outside the house?

3. Combine the best of students' questions into a fraction questionnaire. Make several copies of the questionnaire for each student. Then assign student pollsters to interview various people in their neighborhood—people of all ages and backgrounds, if possible—to learn how people and fractions get along. Provide clipboards and tape recorders, if available.

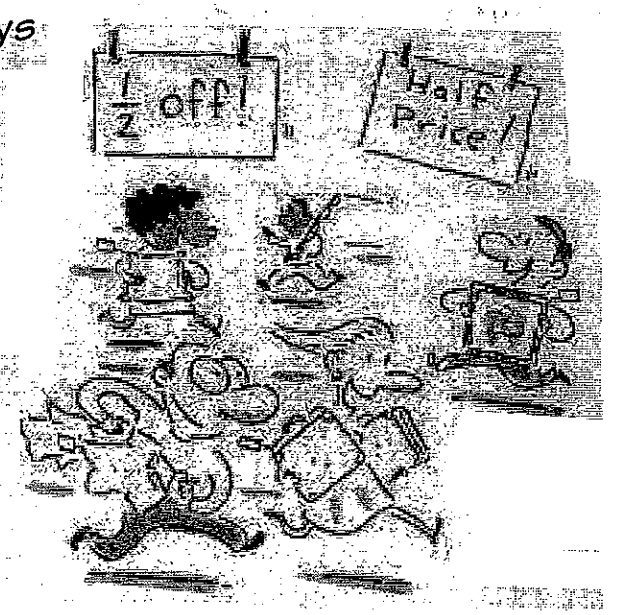
4. Back in class, help students analyze and compare the answers to the questionnaires. After students share their findings, summarize together what the survey reveals about people and fractions. Students may wish to share their findings with those people they interviewed.

Follow-Up

- Extend by having students prepare a letter to the editor of the local newspaper in which they describe the questionnaire they created and the results it showed. In the letter, they can give their opinion on the value of having and using knowledge about fractions.

Halves All Around

Students identify all the everyday ways they use the concept of one-half.



MATERIALS: none

- Elicit from students what is meant by the concept of one-half. List their responses on the chalkboard. Ask them to predict what time it will be when half the school day is over.
- Then have students form small groups. Have groups brainstorm a list of all the different ways they use one-half in their lives. Encourage them to think about things they customarily divide in half (oranges, sandwiches), places they see the concept used (sporting event halftimes, advertisements for sales), things they do half at a time (eat a sandwich).
- Ask groups to share their ideas in a whole-class discussion. Invite them to give demonstrations as needed. Tell them when you are about halfway through the activity.

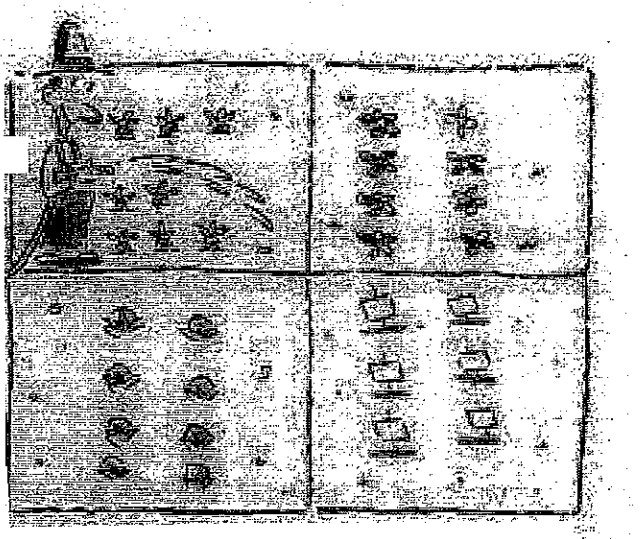
Looks Like a Fraction to Me

Students estimate and then find fractions based on volume.

MATERIALS: cylindrical glass, water, centimeter ruler

- One student fills a container with water. Another estimates the fraction of the glass that is filled. A third measures the actual fraction.
- Students take turns filling and estimating.
- Demonstrate how to use the ruler to measure the fraction.

FRACTION GARDENS



Students use an understanding of fractions of a region to plan a garden.

MATERIALS: centimeter grid paper (p. 88), crayons

- Students outline a large rectangular region of the grid paper to use as their garden.
- They mark off patches of that region and color and label each with the name of a kind of tree, plant, flower, or vegetable.
- Then they write a fraction to show what part of the entire garden each patch is.
- Repeat with gardens and patches of different sizes. Include irregular polygons and other shapes.

FRACTION FORMATIONS

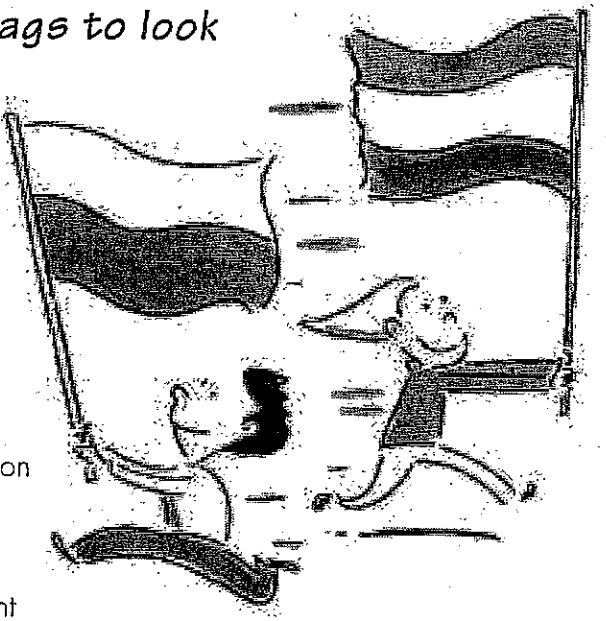
Students manipulate digits to find different fraction sums and differences and to form equivalent fractions.

MATERIALS: four number cards (one each for the numbers 1, 2, 4, and 8)

- Have pairs of students use the cards—one per each term of a fraction—to create two fractions with the greatest (or least) possible sum.
- Have pairs form two fractions with the greatest (and least) difference.
- Have pairs use the four cards to make the greatest (and least) single fraction with a two-digit numerator and a two-digit denominator. Have them use any of the cards to form a fraction closest to or equivalent to a fraction you name, such as $\frac{1}{4}$ or $\frac{2}{3}$.

Fraction Flags

Students examine and analyze world flags to look for fractional patterns.



MATERIALS: pictures of various world flags (from almanacs, encyclopedias, or Web sites)

- Provide pictures of world flags students can examine and analyze to determine which ones are divided into halves, thirds, fourths, or other fractional regions.
- Help students develop a Fraction Flags bulletin board that displays flags sorted by fractional patterns. For example, they might include the flags of Italy and Gabon to show thirds, and use the flags of Monaco and Indonesia to suggest halves.
- Have students include flags that do not readily represent clear fractional parts, such as Kiribati, Qatar, Seychelles, and Zimbabwe.
- Challenge students to use equivalent fractions to describe the fractional parts of the flags of Eritrea, Chile, Jamaica, and Thailand.

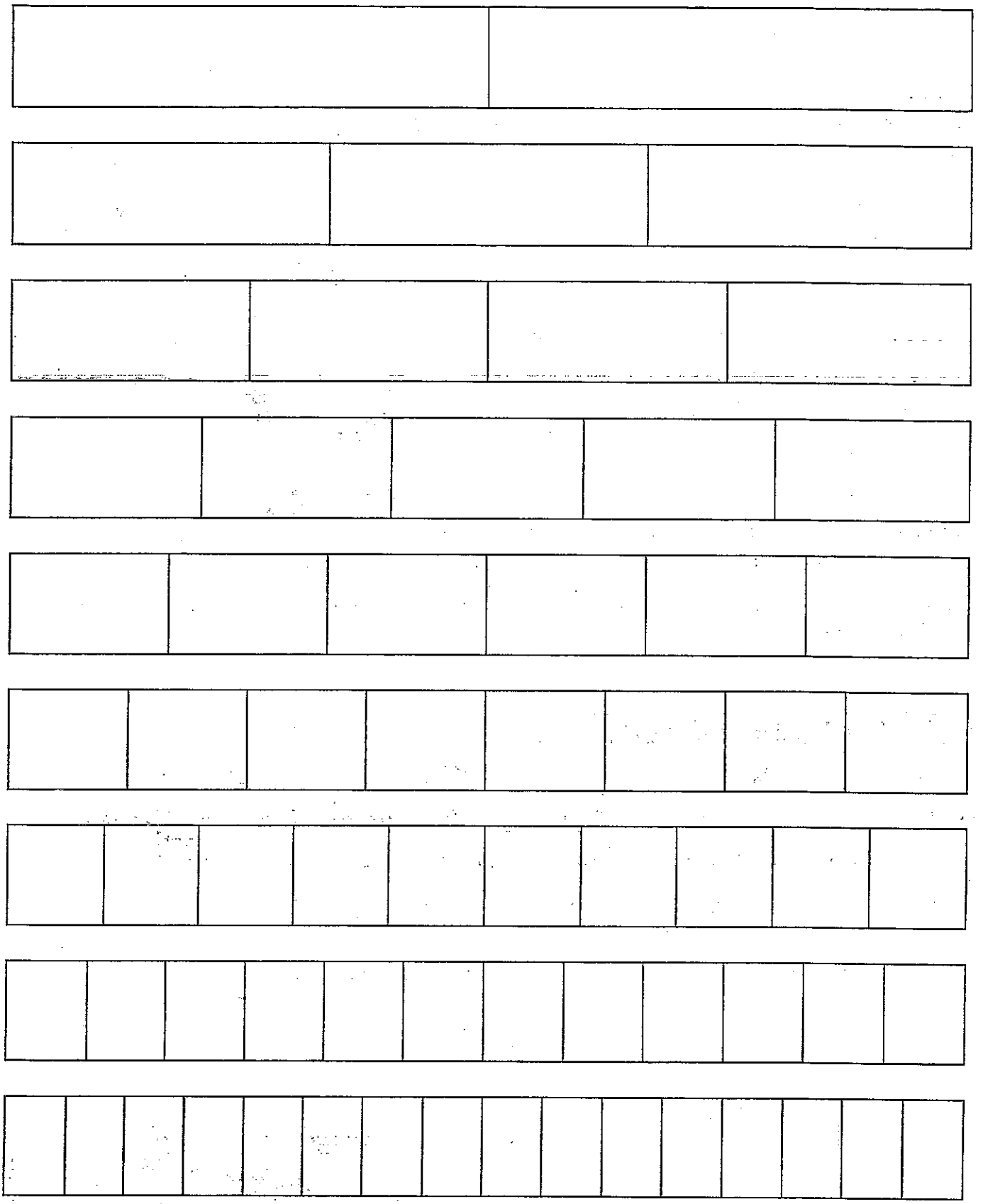
Fraction Recipes

Students apply their knowledge of fractions to work with recipes.

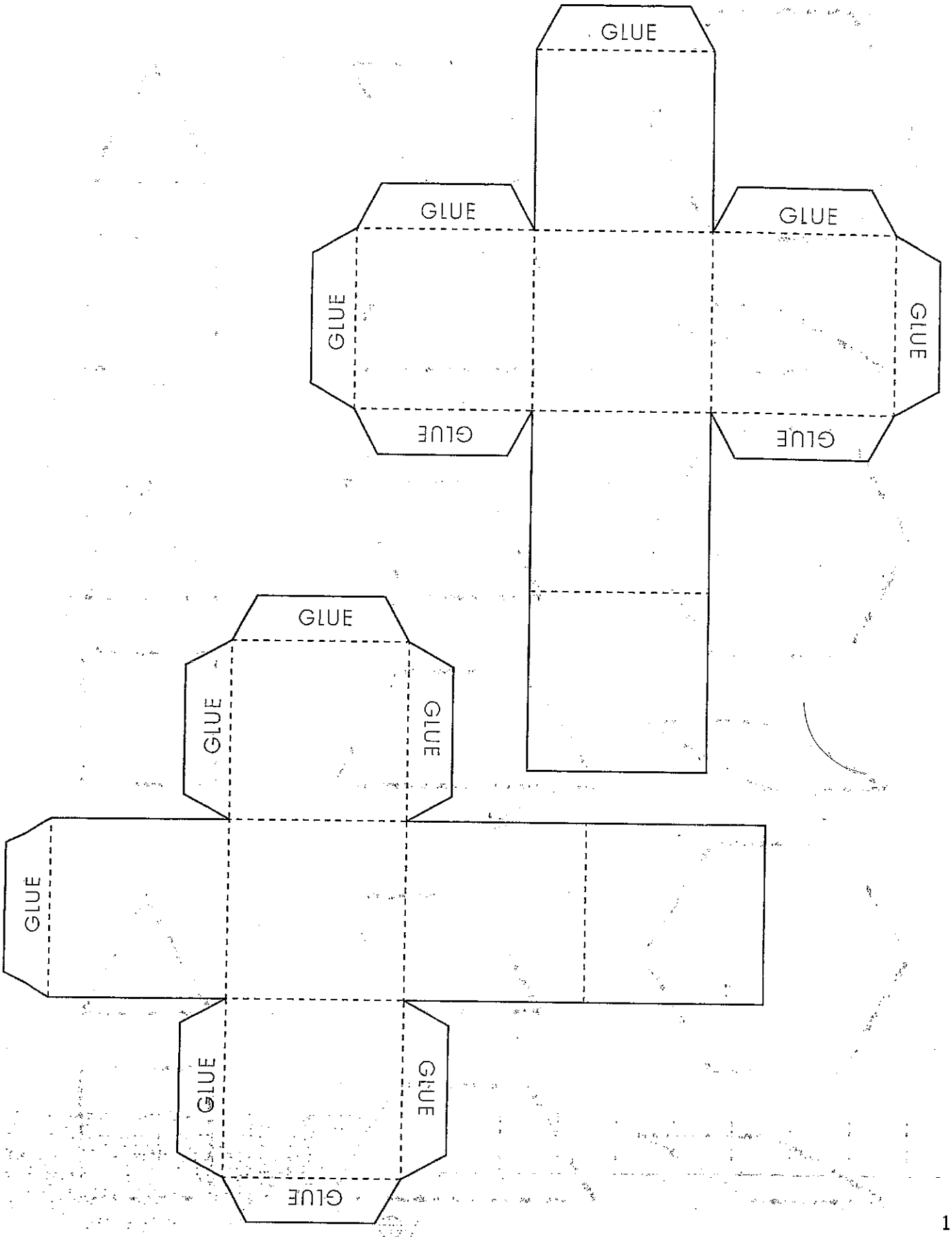
MATERIALS: recipes that involve fractional amounts (see cookbooks or Web sites)

- Provide recipes. Challenge students to determine the quantities to use to prepare double or triple the amount, or to divide the recipe in half or in fourths.
- Have a cooking day on which small groups prepare simple recipes together.

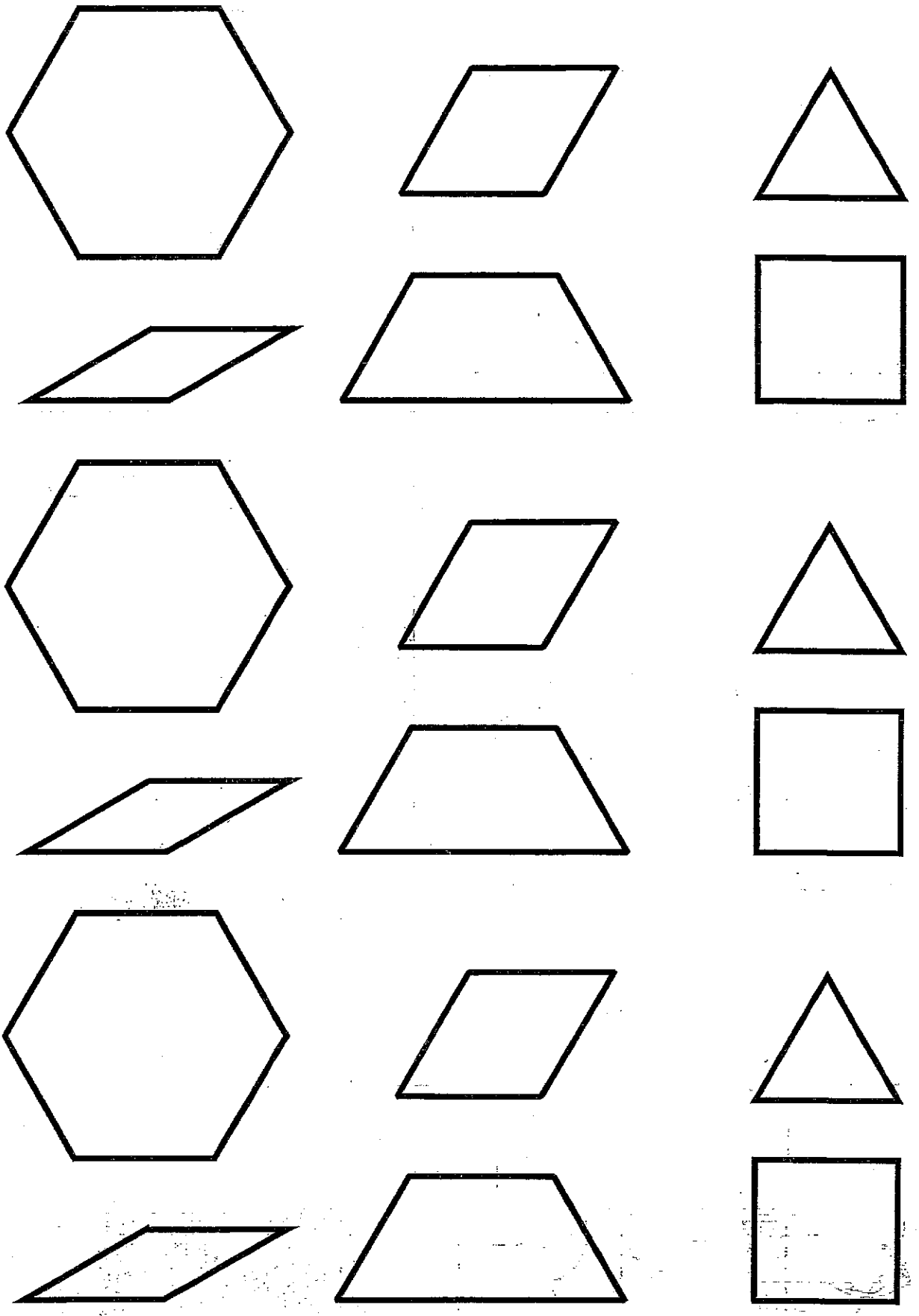
Fraction Strips



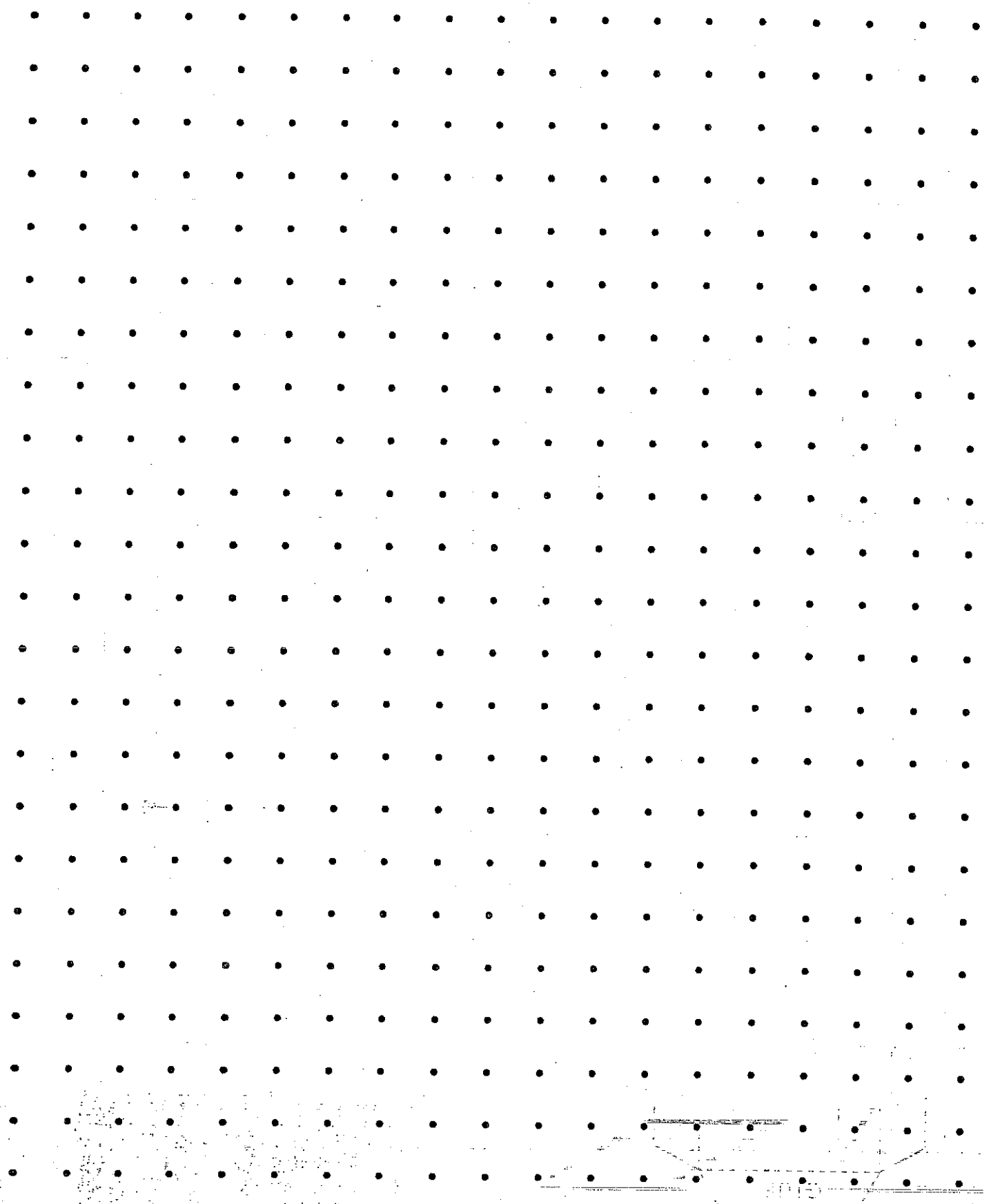
Number Cubes



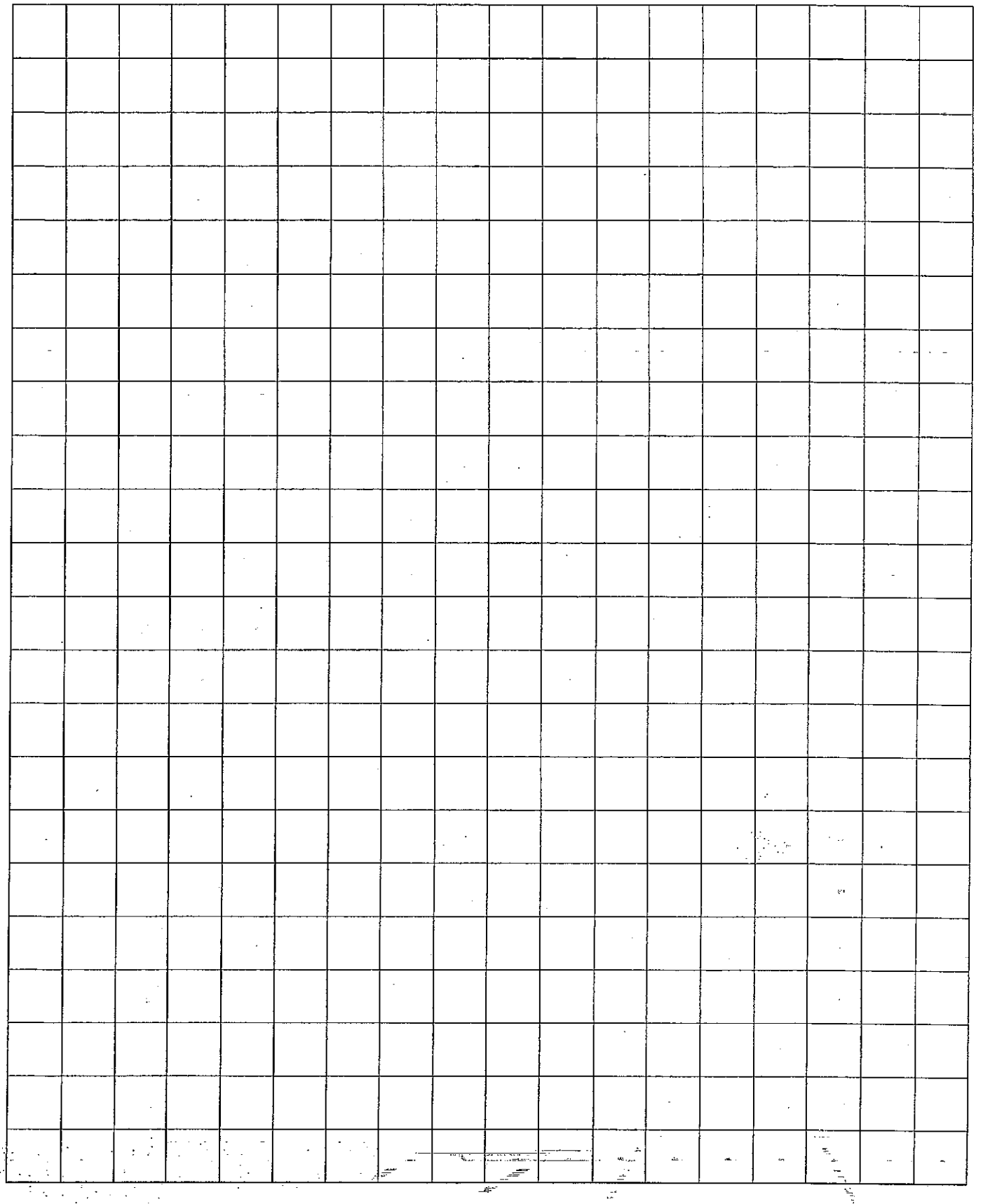
Pattern Blocks



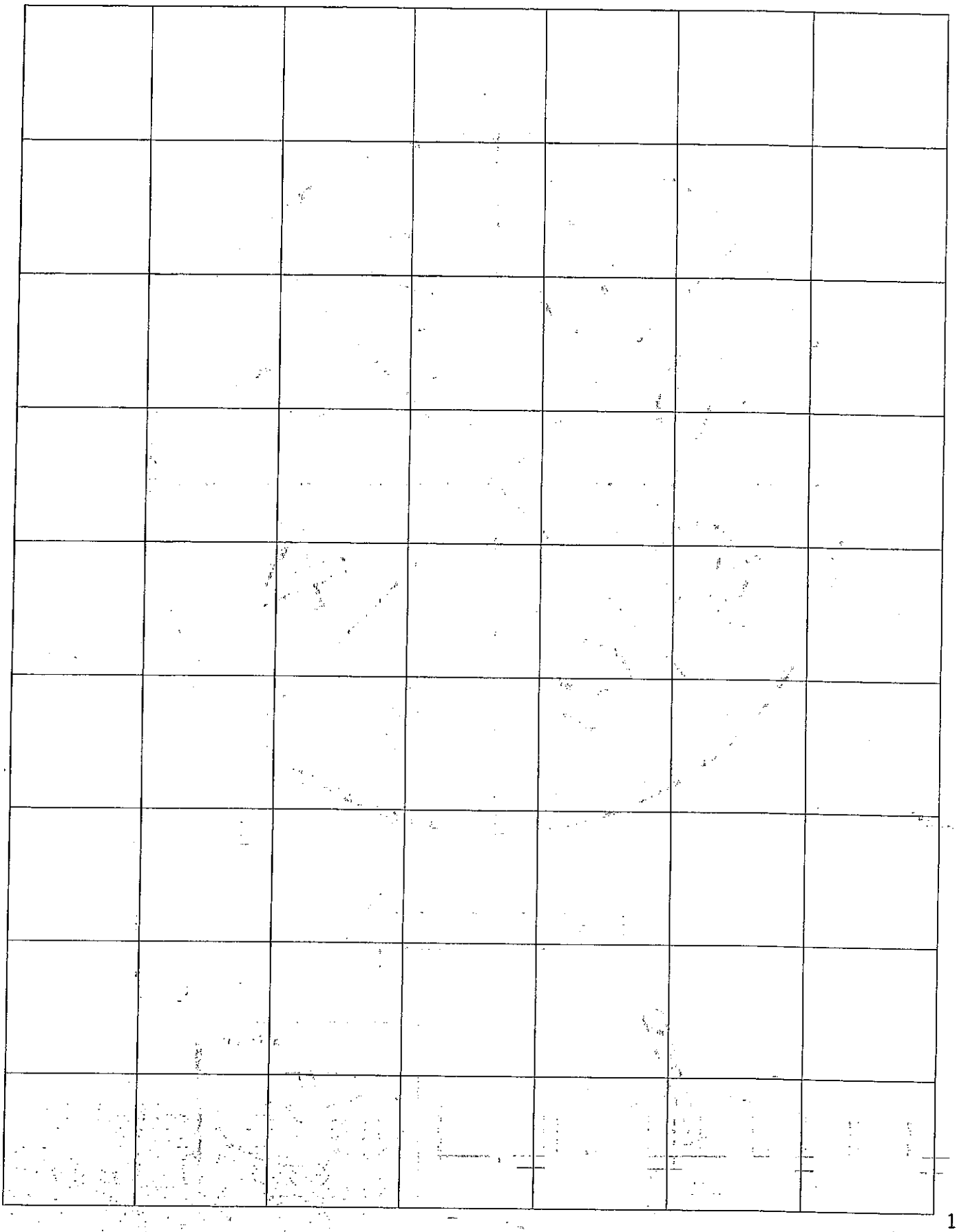
Dot Paper



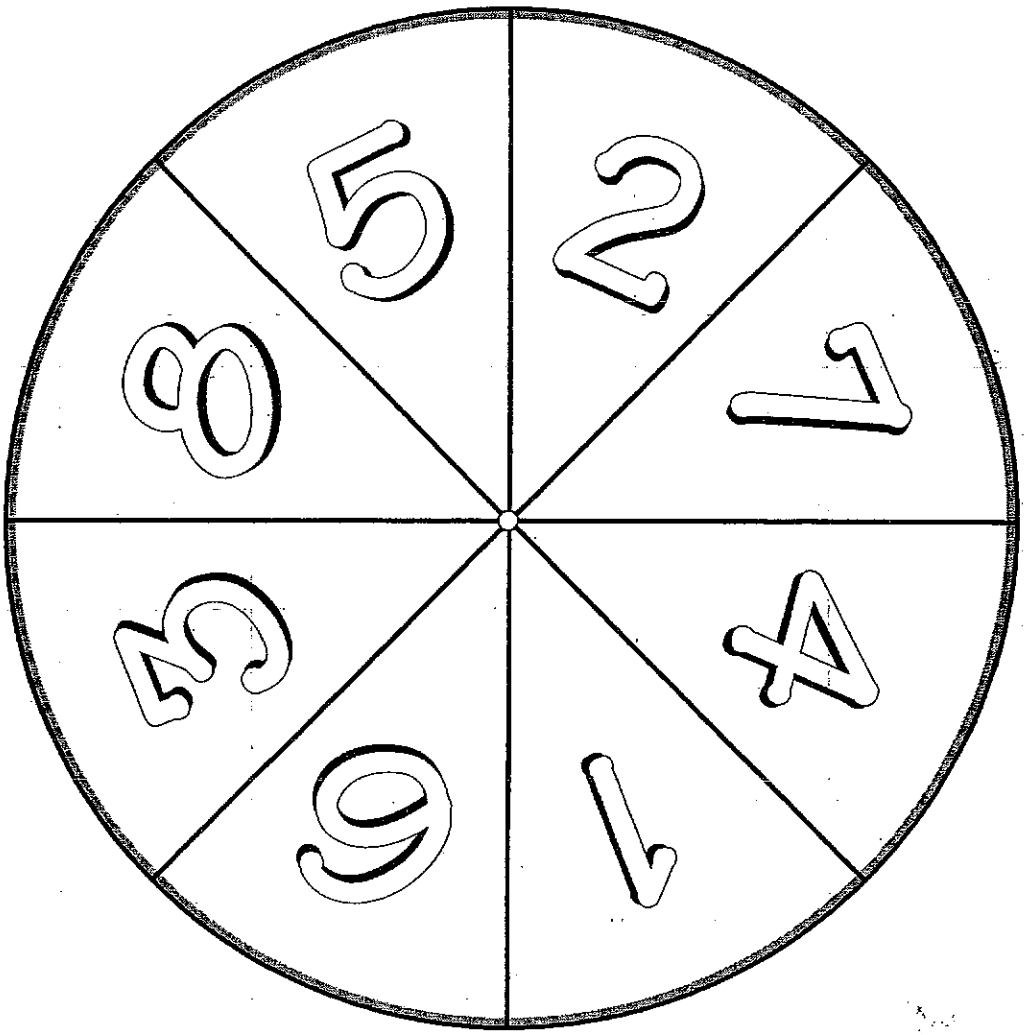
Centimeter Grid Paper

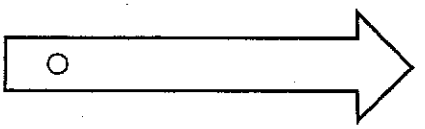


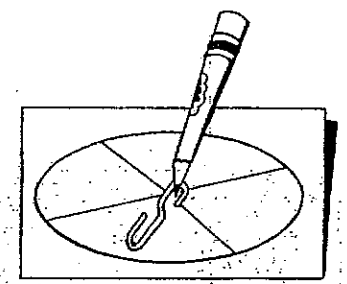
Inch Grid Paper

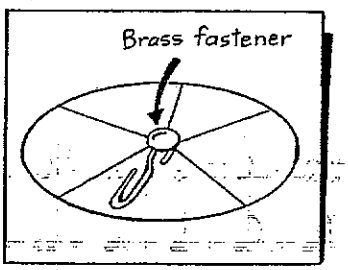


Spinner

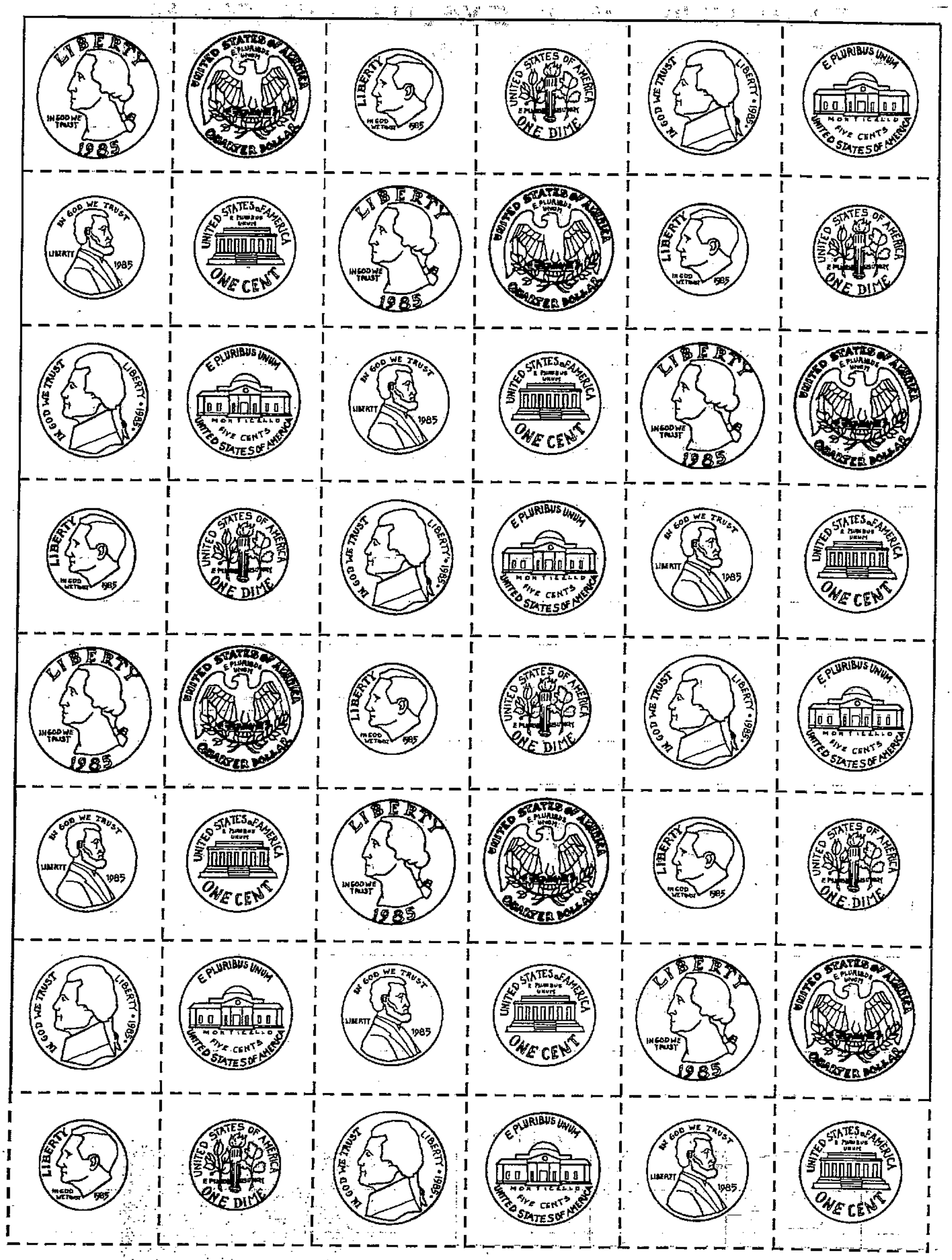








COINS



Name _____ Date _____

Fraction Self-Evaluation Form

1. Here's how I feel about fractions: _____

2. My favorite fraction activity was _____

   I liked it because _____

3. The fraction activity that was hardest for me was _____

   I think it was hard because _____

4. An important idea I learned about fractions is _____

5. I rate my understanding of fractions as (circle one)

   Strong Good Fair Weak

   Explain. _____

6. Something I still don't understand about fractions is _____

7. In future work with fractions, I hope to learn _____

Halfness
(p. 8)

Answers will vary.

Fill All Four
(p. 11)

Solutions will vary.

What's in Petal, Mississippi?
(p. 12)

The Checker Hall of Fame

What's Left?
(p. 13)

1. $\frac{1}{4}$
2. a. $\frac{1}{2}$; b. $\frac{3}{4}$; c. $\frac{1}{4}$
3. a. $\frac{1}{3}$; b. $\frac{5}{6}$; c. $\frac{1}{6}$
4. a. $\frac{7}{8}$; b. $\frac{1}{8}$; c. $\frac{5}{8}$

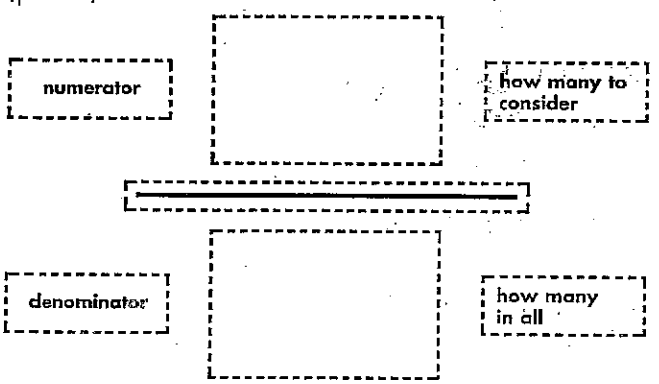
Fractions up a Tree
(p. 14)

Check students' drawings.

Colorful Regions
(p. 15)

Check students' drawings.

Fraction Chart Puzzle
(p. 17)



Part Art
(p. 18)

Check students' figures.

Collaborative Quilts
(p. 19)

Quilts will vary.

Pattern Block Proofs
(p. 21–22)

1. $\frac{1}{8}$; $\frac{2}{8}$ or $\frac{1}{4}$
2. $\frac{3}{8}$; $\frac{3}{8}$
3. $\frac{1}{8}$, $\frac{3}{8}$
4. $\frac{1}{32}$; $\frac{6}{32}$ or $\frac{3}{16}$
5. $\frac{6}{32}$ or $\frac{3}{16}$; $\frac{18}{32}$ or $\frac{9}{16}$
6. Answers will vary.

Shaded Shapes
(p. 24)

Answers will vary. Check students' drawings.

Stand Up for Fractions
(p. 25)

Answers will vary with the number of students in your class.

Class Fraction Wall
(p. 26)

Answers will vary with the number of students in your class.

Picture These Fractions
(p. 27)

Answers will vary according to the photographs displayed.

Mixing Snack Mix
(p. 29)

1. 12 raisins, 6 nuts
2. 18 nuts, 6 chocolate chips
3. 12 raisins, 12 chocolate chips, 12 nuts
4. No; there are 3 too few chocolate chips
5. Sample answer: $\frac{1}{2}$ are chocolate chips, $\frac{3}{8}$ are raisins, $\frac{1}{8}$ are nuts
6. Recipes will vary.

Fraction Message
(p. 30)

Albuquerque, New Mexico

The Language of Fractions
(p. 31)

1. numerator
2. fifth
3. sixth
4. quarter
5. improper
6. half
7. equivalent
8. denominator
9. eighth
10. tenth
11. third
12. fourth

Fraction Dictation
(p. 32)

$\frac{1}{2}$, $\frac{2}{7}$, $\frac{1}{4}$, $2\frac{1}{2}$, $\frac{2}{3}$, $2\frac{1}{5}$, $\frac{5}{6}$, $\frac{1}{3}$, $\frac{7}{8}$, $\frac{11}{12}$, $4\frac{1}{4}$, $\frac{98}{100}$

Fractions and Egg Cartons
(p. 33)

Check students' models.

Badge Buddies
(p. 34

Check the badges on each buddy pair.

Equivalent Fraction Concentration
(p. 35)

Check students' pairs as they play.

Fraction Bingo—Times Two
(p. 36)

Winning cards will vary.

Fraction Poems
(p. 40)

(No answer)

Sharing Fraction Pie
(p. 41)

Check students' models.

Fraction Fill 'Em Up
(p. 42)

Check students' models.

Prove It!
(p. 43)

Evaluate students' arguments as they are presented.

Fraction War
(p. 44)

Observe students as they play.

Fraction Rollers, Part 1
(p. 45)

Greatest and least fractions will vary depending on the numbers rolled.

That's an Order!
(p. 46)

Answers will vary depending on the cards drawn. Observe students as they play.

Fractions of a Day
(p. 47)

Answers will vary for each student.

Time for Fractions
(p. 50)

Observe students as they play.

Coining Fractions
(p. 51)

Answers will vary depending on the coins chosen. Observe students as they play.

Funny Money
(p. 52)

1. 8
2. 4; Q, D, N, P
3. 2; N, P
4. 6; 2 Q, D, 3 P
5. 8¢; N, 3 P
6. 65¢; 2 Q, D, N
7. Sample answer: $\frac{1}{4}$ of the coins could be worth 50¢ (as two quarters), while $\frac{1}{2}$ of the coins could be worth 13¢ (as 1 dime and 3 pennies); Kelly is right.

Fractions and Ages
(p. 53)

Answers will vary; check students' charts.

Fraction Rollers, Part 2
(p. 54)

Greatest and least mixed numbers will vary depending on the numbers rolled.

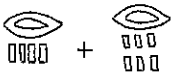
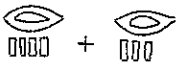
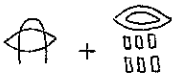
Noting Fractions
(p. 56)

1. $\frac{1}{2} + \frac{1}{4} = \frac{3}{4}$
2. $\frac{1}{2} + \frac{1}{4} + \frac{2}{8} = 1$
3. $\frac{1}{4} + \frac{1}{8} + \frac{2}{16} = \frac{1}{2}$
4. $1 + 1 + \frac{1}{4} + \frac{1}{8} = 2\frac{3}{8}$
5. $\frac{1}{2} + \frac{1}{4} + \frac{1}{4} + \frac{1}{4} + \frac{1}{8} = 1\frac{3}{8}$
6. $1 + \frac{1}{16} + \frac{2}{16} = 1\frac{3}{16}$
7. $\frac{1}{2} + \frac{1}{8} + 1 + \frac{1}{4} + \frac{1}{8} = 2$
8. $\frac{2}{8} + \frac{2}{16} + \frac{1}{8} + \frac{2}{16} = \frac{5}{8}$
9. ♩ + ♩ + ♩ + ♪ = $\frac{7}{8}$
10. 𝅗𝅥 + ♩ + ♫ = 1
11. 𝅝 + 𝅝 + 𝅗𝅥 + ♫ = $2\frac{5}{8}$
12. 𝅗𝅥 + 𝅗𝅥 + 𝅝 + 𝅗𝅥 + ♩ = $2\frac{3}{4}$
13. 𝅝 + 𝅝 + ♩ + ♩ + ♪ + 𝅘𝅥𝅯 = $2\frac{11}{16}$

A Head for Fractions
(p. 57)

Observe students as they play.

Fractions in Ancient Egypt
(p. 59)

1.  2.  or  3. 
4.  5. 
6. 

Flicker Fraction Sums
(p. 61)

Answers will vary; observe students as they play.

Fraction Add-Up
(p. 64)

Answers will vary. Check students' work.

Sums on a Roll
(p. 65)

Answers will vary; observe students as they play.

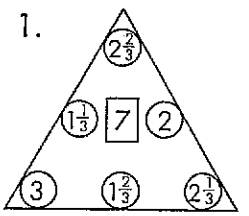
Fraction Path Puzzles
(p. 67)

Path 1: +, −

Path 2: +, +, −

Path 3: +, −, +, −

Fraction Magic Figures
(p. 69)

1. 

2.

$2\frac{2}{3}$	$\frac{1}{3}$	2
1	$1\frac{2}{3}$	$2\frac{1}{3}$
$1\frac{1}{3}$	3	$\frac{2}{3}$

3.

12	$4\frac{1}{2}$	6
$1\frac{1}{2}$	$7\frac{1}{2}$	$13\frac{1}{2}$
9	$10\frac{1}{2}$	3

4.

2	$\frac{1}{4}$	$\frac{3}{8}$	$1\frac{15}{24}$
$\frac{5}{8}$	$1\frac{3}{8}$	$1\frac{1}{4}$	1
$\frac{9}{8}$	$\frac{7}{8}$	$\frac{3}{4}$	$1\frac{1}{2}$
$\frac{1}{2}$	$1\frac{3}{4}$	$1\frac{7}{8}$	$\frac{1}{8}$

Parts of Parts

(p. 71)

1. $\frac{1}{8}$
2. $\frac{1}{8}$
3. $\frac{3}{8}$
4. $\frac{1}{6}$
5. $\frac{1}{6}$
6. $\frac{2}{6}$ or $\frac{1}{3}$

Roll, Round, and Record

(p. 73)

Answers will vary; observe students as they play.

Fractions and Calories

(p. 75)

1. 1 hour
2. 15 minutes or $\frac{1}{4}$ hour
3. $\frac{2}{5}$ of an hour, or 24 minutes
4. She can bike or swim for about a half hour.
5. $\frac{350}{400}$, or $\frac{7}{8}$ of the calories
6. $1\frac{1}{2}$ cups of ice cream

Fraction Stories

(p. 76)

Answers will vary; check students' stories.

Fraction Scavenger Hunt

(p. 78)

Solutions will vary; check students' scavenger hunt sheets.

Only One-Third Agreed That...

(p. 79)

Surveys and analyses will vary; check students' work.

Fractions Every Day

(p. 80)

Surveys and analyses will vary; check students' work.

5th Grade Shape Sorter

You will be working with a partner to design a machine that can specifically name and sort any triangle or quadrilateral. You will be required to draw, describe, and present your machine. This project will count as a quiz grade, so please put your best foot forward and showcase your creativity.

Design a machine that will sort the polygons listed below:

- Triangles
  - Right
  - Acute
  - Obtuse
  - Scalene
  - Isosceles
  - Equilateral
- Quadrilaterals
  - Trapezoid
  - Paralelogram
  - Rhombus
  - Rectangle
  - Square
  - Kite

1. Draw a detailed diagram of the machine in action. Your diagram must be neat and include information that we have talked about in class (see your marble for help). Your diagram must also include the following with labels:

- A place to load the shapes
- A location or device where triangles and quadrilaterals are separated
- A route or path through your machine that helps to categorize your shapes (How does it detect angles, side length , parallel sides, adjacent sides, etc)
- A device or tool that helps sort shapes that belong in more than one category
- Locations or containers for your shapes to be sorted into
- A name of title for your machine

REMEMBER: Your machine needs to be able to tell the difference between all the different types of triangles and quadrilaterals

2. Provide a detailed, written response the explain how your machine would sort the following shapes. Only one person needs to type this, but both teammates should be working on it. Please print out your response and hand it in to me with your diagram. You will be graded on the clarity of your response so make sure to use correct grammar and punctuation.

- Equilateral triangle
- Rhombus

3. Finally you will present your machine to the class and describe to them what happen to shape as they move through more machine, Make sure you discuss:

- How the machine knows the difference between a triangle and a quadrilateral
- How the machine recognizes the different characteristics of the triangles and quadrilaterals
- What the machine does with a shape once it recognizes it
- How the machine handles shapes that belong in more than one category

During your presentation, your classmates can ask questions about your device. You will need to be prepared to answer their questions as well.

Team members :

_____

Rubric

Diagram

- A place to load the shapes _____/1 point
- A location or device where triangles and quadrilaterals are separated _____/2 points
- A route or path through your machine that helps to categorize your shapes (How does it detect angles, side length, parallel sides, adjacent sides, etc) _____/8 points
- A device or tool that helps sort shapes that belong in more than one category _____/ 3 points
- Locations or containers for your shapes to be sorted into _____/1 points
- A name of title for your machine _____/1 points

Total = _____/16 points

Written Response (Points are earned based clarity (including grammar and punctuation) and math knowledge)

- Description of what would happen to an equilateral triangle as it went through your machine _____/5 points
- Description of what would happen to a rhombus as it went through your machine _____/5 points

Total = _____/10 points

Presentation

- How the machine knows the difference between a triangle and a quadrilateral _____/2 points
- How the machine recognizes the different characteristics of the triangles and quadrilaterals _____/2 points
- What the machine does with a shape once it recognizes it _____/2 points
- How the machine handles shapes that belong in more than one category _____/2 points
- How your team handled questions from the audience _____/2 points

Total = _____/ 10 points\

Project Total = _____/36 points

Party Statistics

Party Planning Committee

_____

_____

_____

Number of Guests: _____

The number of guests must be a number divisible by 12. You cannot have more than 80 guests.

25% of your guests love to dance _____

60% of your guests are under the age of 12 _____

1/6 of your guests are allergic to nuts _____

Of the guests who are allergic to nuts, ½ are also allergic to milk _____

Duration of the party: _____

The length of your party must be a whole number between 3 and 9.

Location: Please select an option below. If there is a cost, that must be included in the final total.

Your Home- Free

Verona Park - Free

North Caldwell Fire Hall - $300

Green Brook Country Club- $600 for 4 hours; $100 for each additional hour

Coupon Value: _____

Snacks

Item	Quantity	Unit Rate	Total (calculator)
This is the total before tax and discount		Subtotal: (no calculator from this point on)	
Coupon Used: _____ Amount saved from coupon: _____ (round to the penny)		Total after Discount:	
Find the tax on the total after discount (round to the penny) Add the tax and the total after discount together		7% sales tax:	
		Total with tax:	

Lunch/Dinner

Circle one

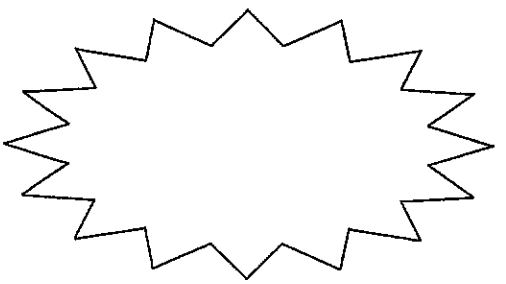
Beverages			
Item	Quantity	Unit Price	Total (Calculator)

Meal			
Item	Quantity	Unit Price	Total (Calculator)
Total of Beverages and meal 18% of the subtotal (round to the penny) Add subtotal and gratuity		Subtotal: (No Calculator beyond this point)	
		Gratuity:	
		Total:	

Dessert			
Item	Quantity	Unit Price	Total (Calculator)
Total of all sweets 7% of subtotal (round to the penny) Add subtotal and tip		Subtotal: (No calculator beyond this point)	
		Tip:	
		Total:	

Grand total of all food and drink, including tax and tip:

(Calculator allowed)



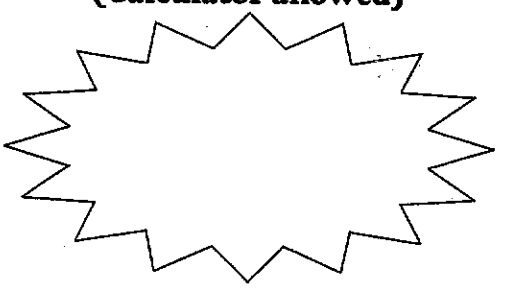
Miscellaneous

Paper Products and Decorations			
Item	Quantity	Unit Rate	Total (calculator)
This is the total before tax and discount		Subtotal: (No calculator beyond this point)	
Coupon Used: _____ Amount saved from coupon: _____ (round to the penny)		Total after Discount:	
Find the tax on the total after discount (round to the penny) Add the tax and the total after discount together		7% sales tax: Total with tax:	

Entertainment			
Item	Quantity	Unit Price	Total (calculator)
Total of beverages and meal 15% of the subtotal (round to the penny) Add subtotal and gratuity		Subtotal: (no calculator beyond this point)	
		Gratuity:	
		Total:	

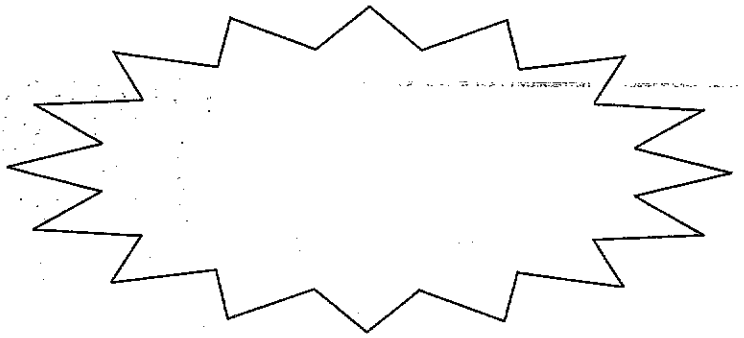
Grand total of all miscellaneous items, include tax and tip:

(Calculator allowed)



Total cost of the entire party!!!!!

(Including location fee, if applicable)



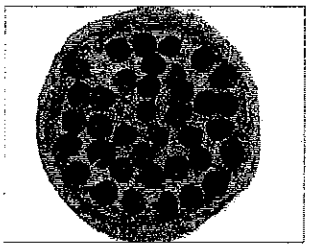
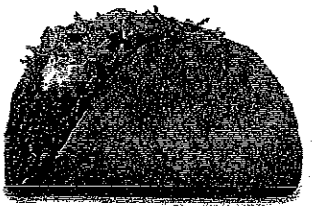
Snacks/Appetizers

Potato Chips - 3 bags for $4.50 One bag serves 10 people  You can't party without a potato	French Onion Dip - $3.75 1 jar serves 20 people  Better put some breath mints in the piñata!
Doritos - $2.25 a bag One bag serves 10 people  What are the blue specks on the chip? I don't know, but they sure are delicious!	Soft Pretzels - $1.25 a pretzel  A Philadelphia Phavorite!! Mrs. Linden couldn't live without them. (Ok that is a hyperbole... but still!)
Tostitos - $2.50 a bag One bag serves 10 people  Mmmm salty and corny!!	Salsa - $2.25 Buy one get on free One jar serves 10 people  The mild kind, so your mouth won't catch on fire!
Veggie Tray - $32 a tray One tray serves 20 people  The natural crunch. Comes with Ranch Dip.	Chicken Tenders - $48 a tray One tray serves 30 people <u>Fried in Peanut Oil</u>  Don't eat too many, you'll spoil your dinner! #thingsyourmomsays

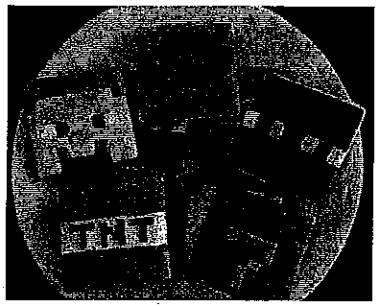
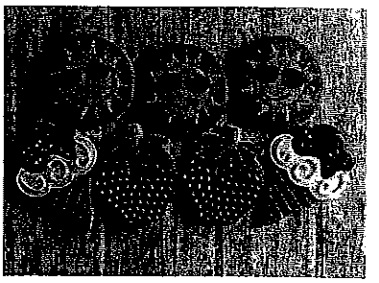
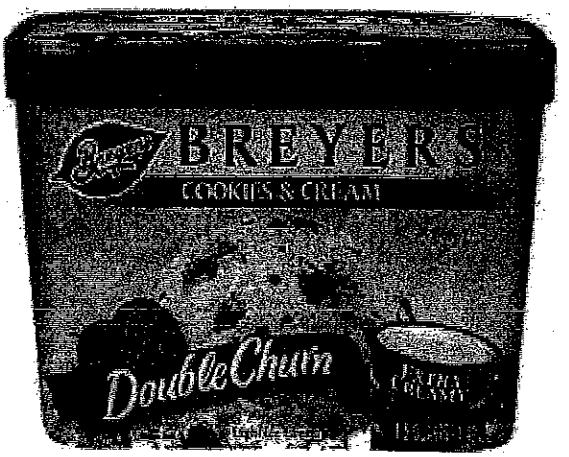
Beverages

Case of water - $4.50 2 dozen bottles  Gotta stay hydrated!	Juice boxes - $6.25 for an 8 pack  Stock up! Kids never finish these. They leave half empty ones all over the place and then get a new one. Come on, you know that's true!
Seltzer – 3 cases for $11 12 cans per case  Bubbles!!!	Ginger Ale – 3 cases for $12 12 cans per case  Made from real ginger, so it must be good for you!

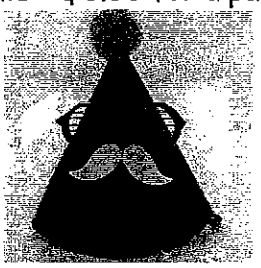
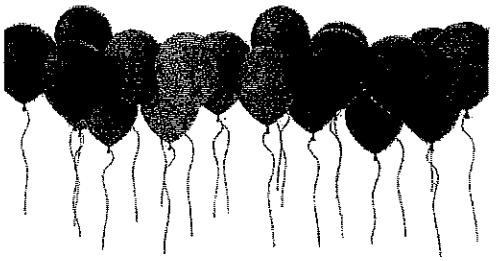
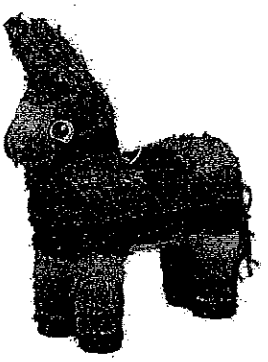
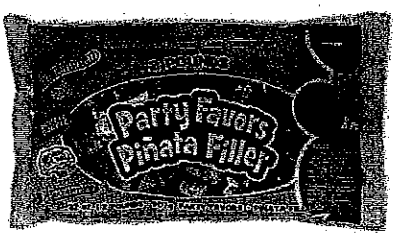
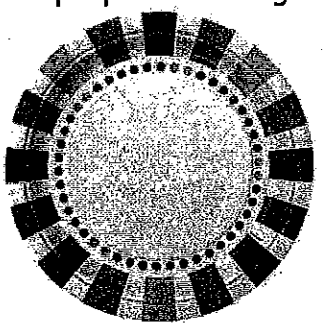
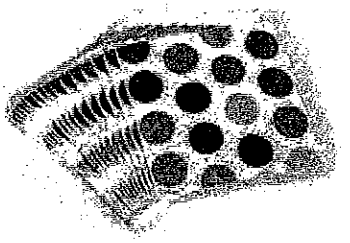
Meals

Pizza PARRRTAY!!! Pizza - $8.50 a pie Average adult eats two slices. A pie comes with 8 slices 	Grillin' and Chillin' Hamburger and Hot Dogs- $7.75 a person Guests get one of each. 
Una Fiesta muy Grande! Tacos – 1 dozen tacos for $15.50 Average adult eats 1 – 2 tacos 	A little bit of veg! Salad Bar – an extra $2.50 a person No extra charge for children 

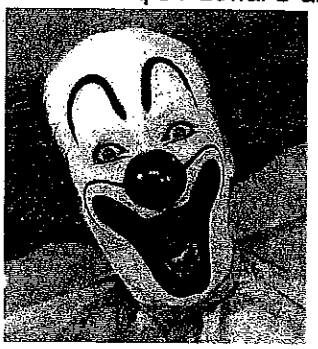
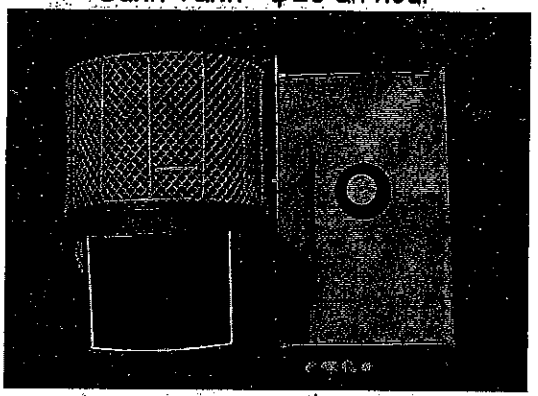
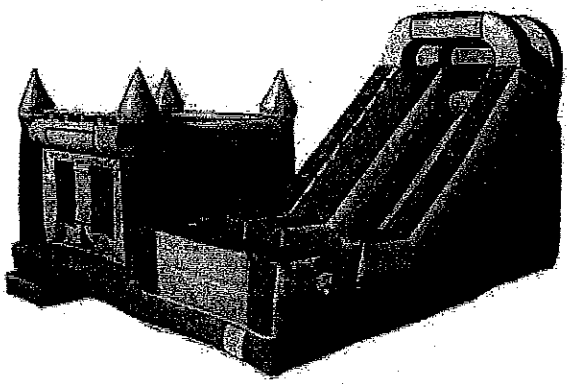
Dessert

Minecraft Cookies - $6.50 for 3 Made in a factory that processes nuts 	Summer Theme Cookies - $6.50 for 3 Made in a factory that processes nuts 
Cake Boss Cake - $49.50 per layer Each layer serves about 20 people.  No more than 5 layers. Let's be real here people!	Ice Cream - $5.50 a gallon 1 gallon feeds 10 people  Remember: Brain freezes are real.

Decorations and Paper Products

Party Hats - $3.50 for a pack of 10  Complete with string that hurts your neck!	Balloons – 20 balloons for $8 
Pinata – $13.25 Hold 5 pounds of candy  A totally non-violent children's game	2 pound bag of candy - $5.75  Your dentist will love you for it!
Paper Plates - $3.75 for 12 Remember people are eating 3 times!!  Totally not doing the dishes!	Napkins - $5.50 for 50  I like polka dots! #sorrynotsorry

Entertainment

DJ Grampy Grey - $52 dollars an hour  Has a tendency to replay songs because he forgets what's already played.	Creepy Clown - $14 dollars an hour  Look at him... enough said!
Dunk Tank - $26 an hour  Comes with all of your 5th grade teachers!	Bounce House - $16 an hour  Guaranteed, no holes!